The Electrical Industry's Weekly Magazine

July 23, 1956

Electrical World

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how you can sell more

STORE LIGHTING

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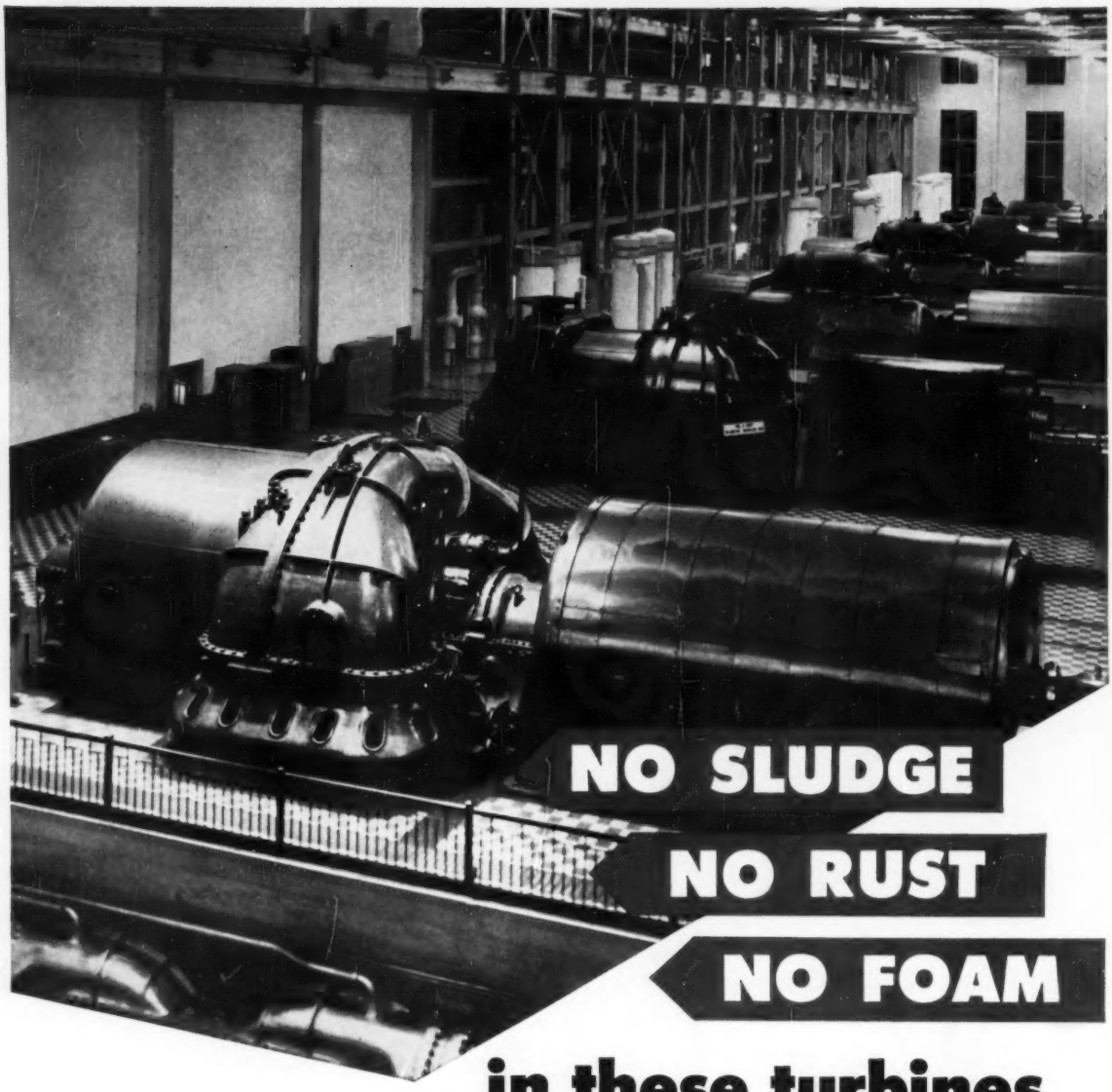

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ELECTRICAL WORLD

Published weekly by McGraw-Hill Publishing Co., Inc., Executive, Editorial and Advertising Offices: **McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y.** Publication Office, 99-129 North Broadway, Albany 1, N. Y.

Donald C. McGraw, President; Paul Montgomery, Executive Vice-President; Joseph A. Gerardi, Executive Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; J. E. Blackburn, Jr., Vice President and Circulation Director.

Subscriptions: Address correspondence to Electrical World—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address.

Subscriptions are solicited only from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields. Position and company connection must be indicated on subscription orders.

Single copies 35¢. For the United States and possessions and Canada, $6 a year, $9 for two years, $12 for three years. Other Western Hemisphere, and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries, $25 for one year, $40 for two years, $50 for three years. Entered as second-class matter at the Post Office at Albany, N. Y. Printed in USA. Copyright 1956 by McGraw-Hill Publishing Company, Inc. Permission required to reproduce any of contents.

Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Vol. 146, No. 4 **July 23, 1956**

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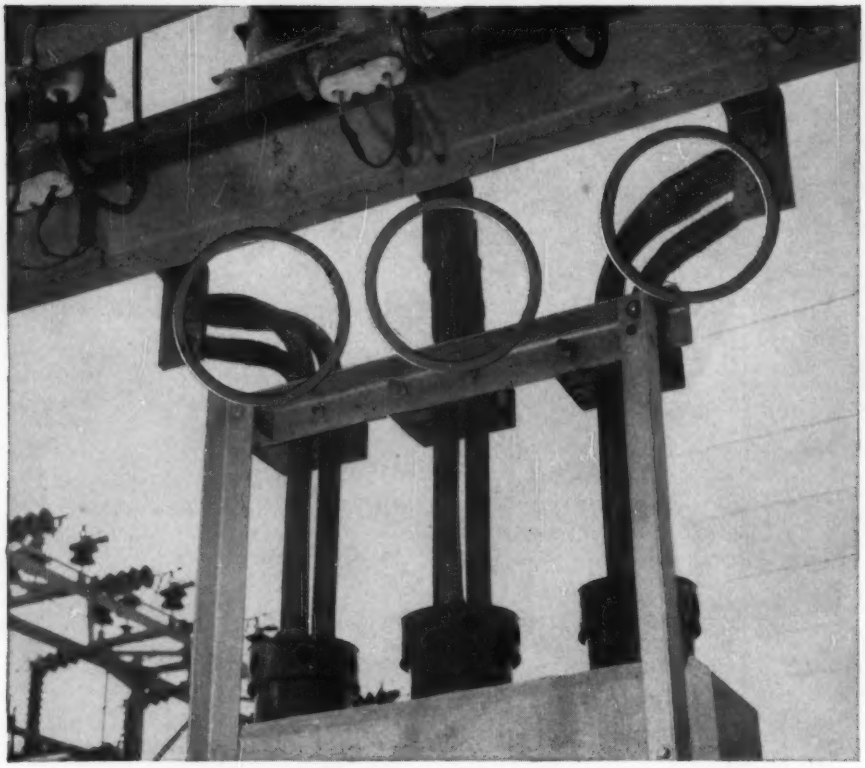

Simplicity of terminating Okolite-Okoprene unshielded 5kv cable is evident in this photograph of the Pearl River Substation feeder circuits of the Rockland Light and Power Company.

Why Okolite-Okoprene UNSHIELDED 5KV CABLE simplifies installation procedure

Ease of termination is an important factor in the increasing choice of unshielded Okolite-Okoprene cable for 5kv distribution circuits. Rockland Light and Power Company specified 500 MCM Okolite-Okoprene unshielded 5kv cable for the 4160-volt feeder circuits in its Pearl River Substation. Terminal stress cones and ground straps are eliminated by the unshielded construction—only a simple, easy-to-apply wrapping of Okoprene tape is needed.

Two electrical characteristics of the Okoprene sheath eliminate the need for a shielding tape, even at 5kv. First, Okoprene's excellent ozone resistance prevents cutting by corona developed on adjacent apparatus. Second, Okoprene's high surface resistivity prevents heavy longitudinal drainage currents, which might cause the sheath to burn at the point where the electrostatic charge flows to ground.

Okonite's new 128-page Bulletin EW-1085 gives complete information on Okolite-Okoprene rubber-insulated cable in the voltage range from 0 to 5000 volts. This bulletin includes detailed cable construction features, engineering information, installation and handling techniques, instructions for splicing and terminating. Never before has all this information been compiled in one book. Write for it to The Okonite Company, Passaic, New Jersey.

Available with either copper or aluminum conductors

OKONITE OKONITE SINCE 1878 ***insulated cables***

2759

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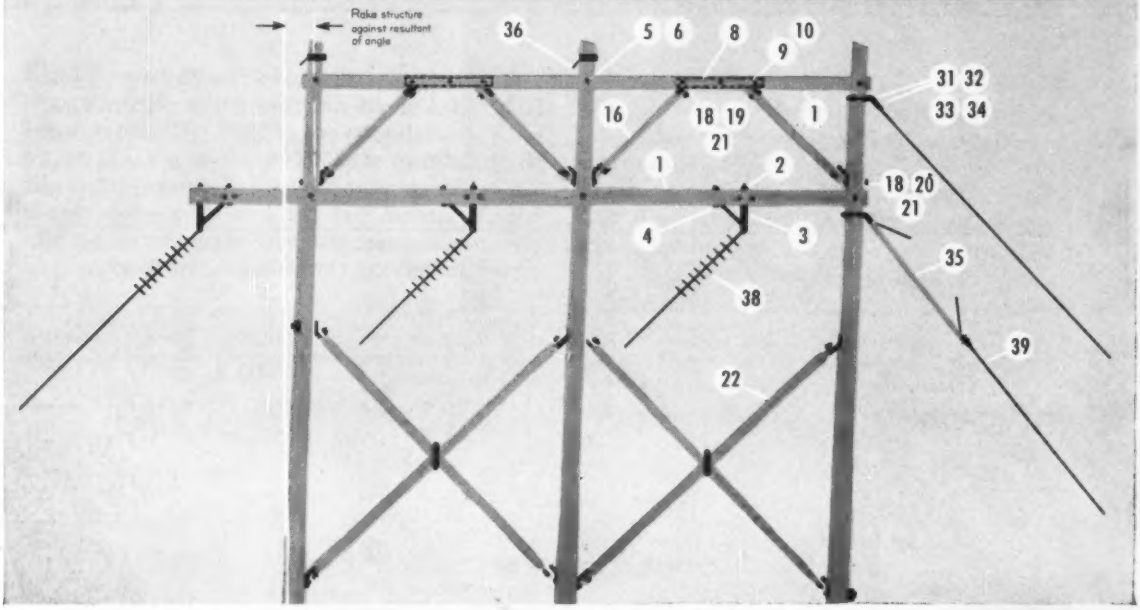
NORMALLY USED FOR ANGLES OF 4° — 15°. ADAPTABLE FOR VOLTAGES FROM 69 TO 154 KV

DRG. REF.#	QUANTITY	DESCRIPTION	DRG. REF.#	QUANTITY	DESCRIPTION
706	3	Pole	21	7	MF locknut ⅞"
1	4	Crossarm	22	2 sets	Cross base w/fittings, clamp, ⅞" pole bolts, and curved washers
2	3	Spacer fitting w/mfg. bolts			
3	3	Swinging angle bracket			
4	3	Saddle w/mfg. bolts	31	4	Pole band
5	6	Stud bolt ⅞" w/2 washer nuts	32	4 pr.	Connecting link
6	12	MF locknut ⅞"	33	1	Guy roller
8	2	Filler block	34	1	Machine bolt ¾" x 2½"
9	6	Stud bolt ¾" w/2 washer nuts	35	1	Wood guy strain insulator
10	12	MF locknut ¾"	36	2	Suspension clamp for static wire
16	4	Knee brace			
18	7	Machine bolts ⅞" w/sq. nut	38	As required	Suspension insulators and fittings
19	4	Flat washer 4" sq. x ¼", 15/16" hole	39	–	Guying material
20	2	Curved washer 4" sq. x ¼" 15/16" hole			



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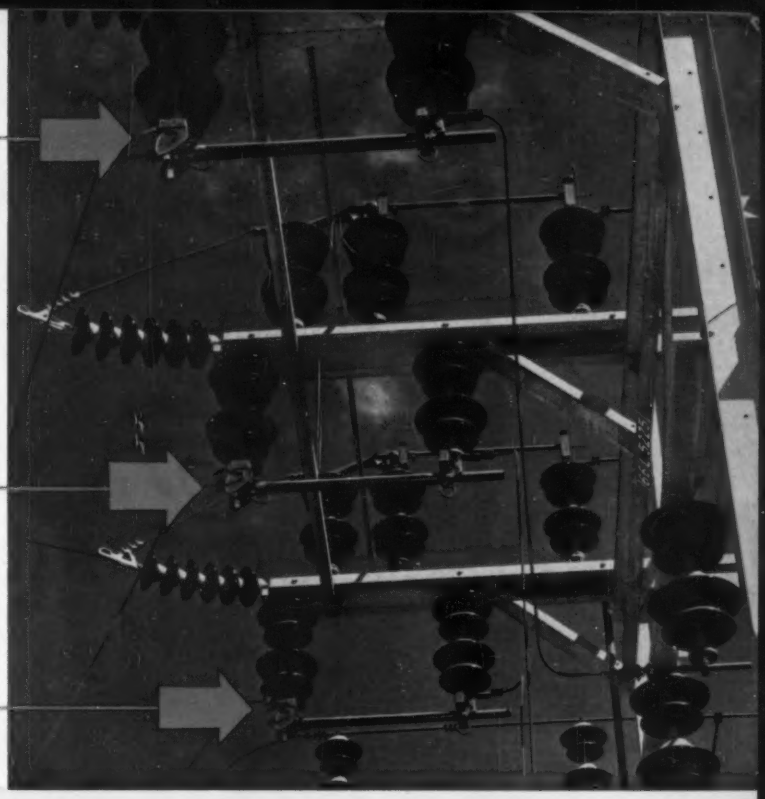
Florida Power & Light Company is the Sunshine State's fastest growing utility. Year after year more manufacturers, more businesses, and more commercial enterprises are moving into the territory it serves. Rapid population gains have increased customers by 138%, and more than tripled demands on the Florida Power & Light system since the end of World War II.

To satisfy these demands, Florida Power & Light has carried on an extensive power expansion program which, by the end of 1955, will have required the investment of $250,000,000 since V-J Day.

For an expansion program of such importance, it is only natural that the greatest possible care is used to make sure that service continuity is maintained and system equipment is protected.

Aerial view of the Hialeah section of Miami—one of the areas where rapid building of homes and industry has increased demand for light and power to six times what it was ten years ago. Hialeah Park is nationally famous . . . open the year around . . . host to hundreds of thousands annually.

COMPANY FUSES



For example, S&C Drop-Out Power Fuses—Type SMD (marked by arrows, right) are installed at Hialeah substation to protect two 7500 kva 69/13 kv transformers which serve Hialeah Park as well as the hundreds of homes and many small industrial plants which surround it.

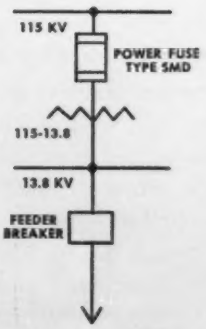
How S&C Power Fuses Are Used in the 69 Kv and 115 Kv System Protection Schemes

The transmission lines of Florida Power & Light Company are tapped at intervals to feed distribution substations. As was originally planned, the power transformers were not always provided with primary protection against secondary faults since primary breakers could not be economically justified.

After a 115 kv power transformer had been lost (for lack of such protection) the matter of protection was reconsidered. It was then decided that this protection was essential and that the device selected must meet these special requirements.

1. Provide system protection over a wide range of fault currents.
2. Coordinate with the transformer damage curve to provide maximum protection to the transformers.
3. Give complete coordination with secondary protective devices over the full range of fault currents.
4. Be capable of withstanding the recovery voltages which might be encountered under various fault conditions.
5. Be low in cost.

S&C Power Fuses, Type SMD, were found to meet all these requirements. Further details of Florida Power & Light's application of these fuses may be found in AIEE Paper No. DP 55-405.



Typical substation tapped directly from Florida Power & Light's transmission lines.

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PULP & PAPER
UNION BAG & PAPER CORP., Savannah, Ga.

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PENNSYLVANIA POWER & LIGHT COMPANY, Allentown, Pa.

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These successful companies, leaders in their respective fields, are building new facilities right now. The power and process piping needed in this construction is being fabricated in Grinnell shops.

In fact, at this time — or at any given time, more than one hundred similar-type orders for prefabricated piping are being worked on by Grinnell. Why this marked preference by so many companies for Grinnell?

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ATTENTION: *A 30-minute color sound film showing the quality and economy of Grinnell Shop Fabrication of all classes of piping is available for group showings.*

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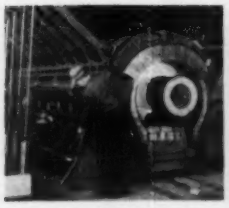
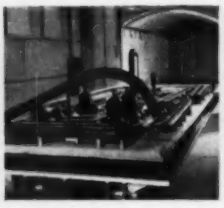
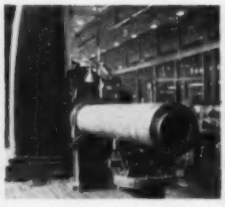


Pipe being heated to exact temperature required for proper bending

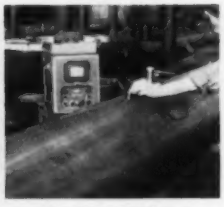
Skilled team completes bend in six minutes with pipe close to 2000°F



Fabricated piping, bending operation completed, enters stress-relieving furnace



Heavy wall pipe being machined to the proper welding bevel on a post mill



Ultrasonic testing of a weld on heavy wall pipe

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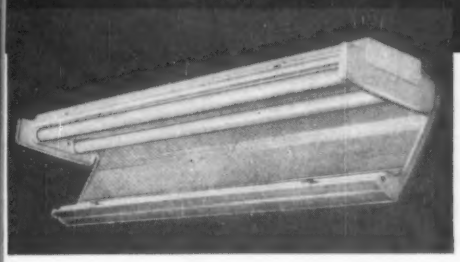

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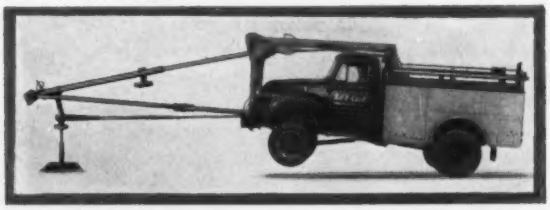
Patents Pending

Designed for front or rear operation, Tel-E-Lect hydraulic derricks and diggers provide new safety features and working ease for digging holes and setting poles. Furnished in complete kits, derricks and diggers are easily controlled from inside the truck cab or at the front or rear of the truck.

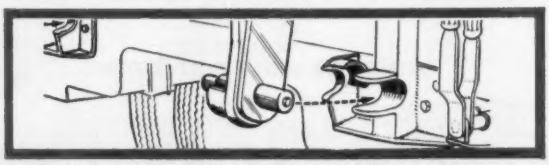
A single double-acting hydraulic cylinder raises and lowers the derrick. The cylinder is equipped with a built-in safety valve that automatically stops the derrick in any position in the event of a hydraulic line failure.

Hydraulic diggers offer smoother rotation and have their own hydraulic lines. When using mechanical diggers a self-locking universal joint and telescopic drive shafts permit fast hook-up to power source. A popular method of suspending diggers is directly from the derrick so that derrick and digger may be raised and lowered as a unit. To utilize the full length of the derrick when reaching across obstacles, up hills and down into ditches, diggers may be suspended from the winch line. Suspension from the derrick, however, gives greater down pressure from the added weight of the truck.

Hydraulic equipment is offered in three "complete packages" for handling poles up to 55′ long. *For complete information on Hydraulic Equipment write for Bulletin H866.*



So powerful is the down pressure exerted on the auger by the derrick that it actually raises the truck's front wheels off the ground.



Derrick legs anchor securely and automatically to truck's frame.

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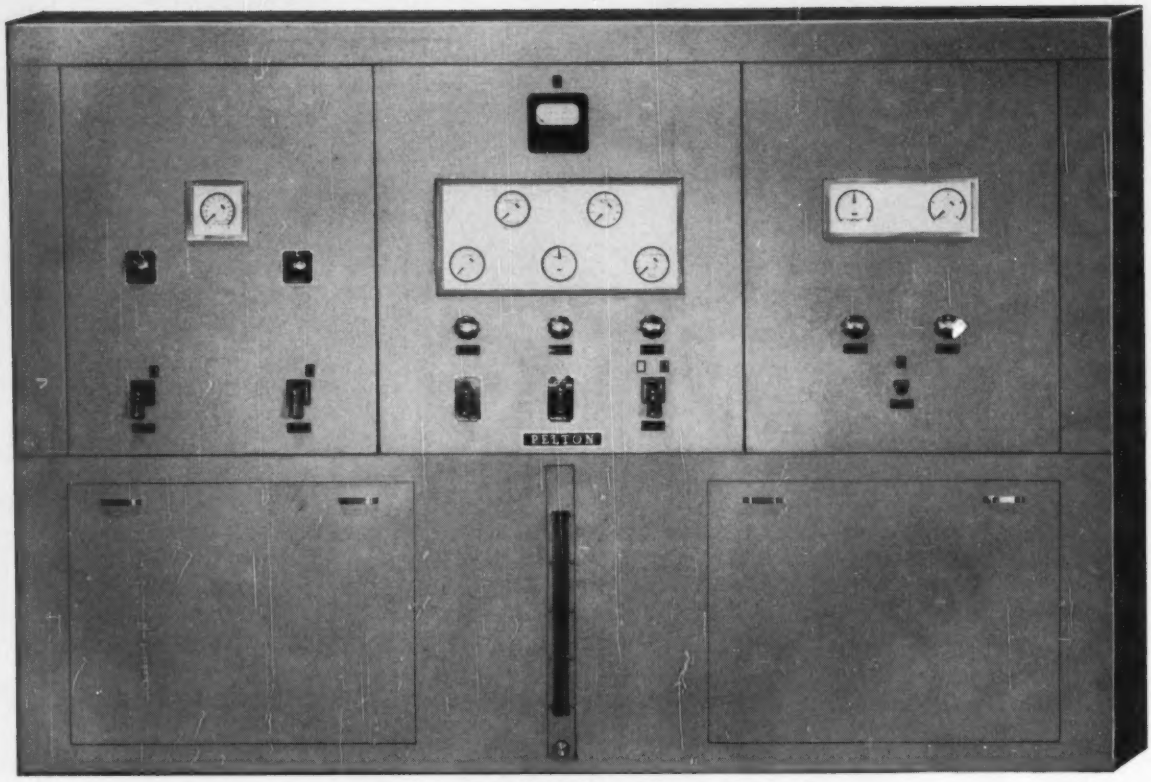

Designed for Nimbus Dam on the American River, California, this Pelton governor has a wicketgate capacity of 126,000 ft.-lbs. and a Kaplan blade capacity of 87,500 ft.-lbs.

Pelton® governor for Nimbus power plant exceeds contract specifications

Prior to installation at Nimbus Dam, this Pelton governor was exhaustively tested under simulated power plant conditions. It was tested under load changes, frequency deviation and variations in speed droop. These notarized tests proved that sensitivity of the speed response element, and over-all governor characteristics will *more* than meet the job.

Pelton pre-tested performance is an integral part of every Pelton product. In addition to governors, BLH manufactures all four basic types of turbines, valves, pumps, surge suppressors and related equipment. For illustrated bulletins, write BLH Corporation, Philadelphia 42, Pennsylvania, or Dept. 5307, Pelton Division (BLH), 2929 Nineteenth Street, San Francisco 10, California.

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Lapp Insulator Co., Inc., Le Roy, N. Y.

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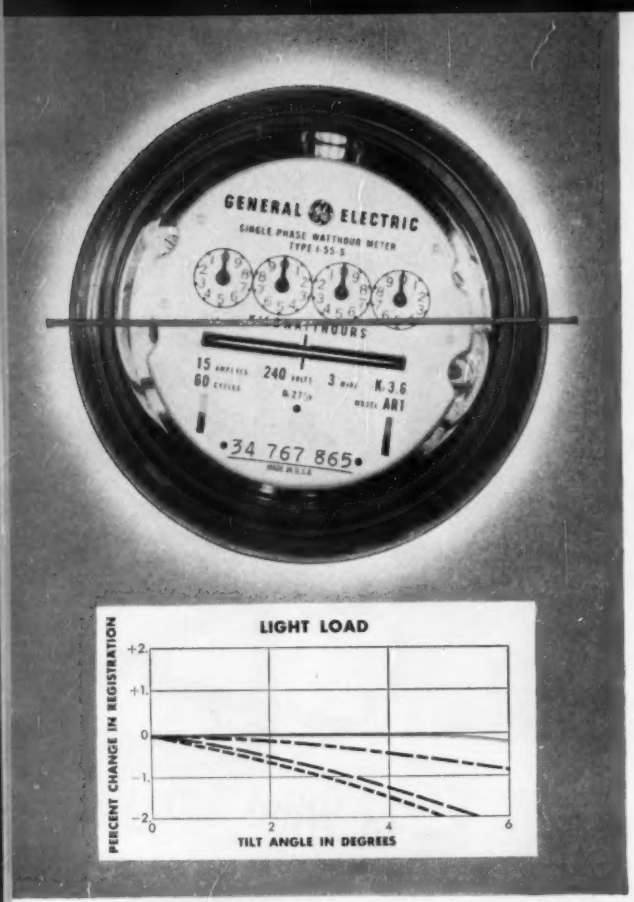
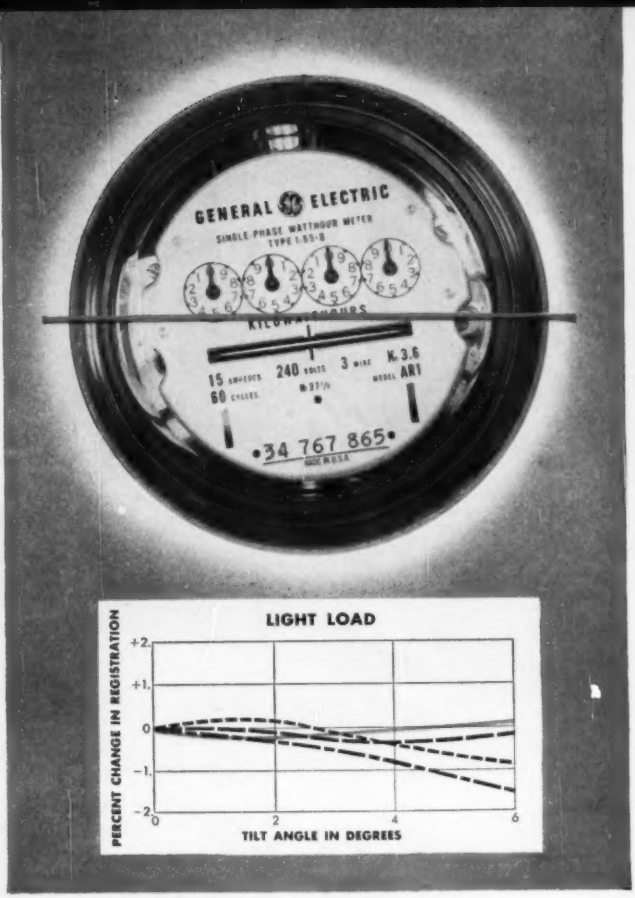
CLOCKWISE



COUNTER-CLOCKWISE



LEGEND: G-E I-55 meter _____ Meter "A"— — — — Meter "B"------- Meter "C"— — - — —

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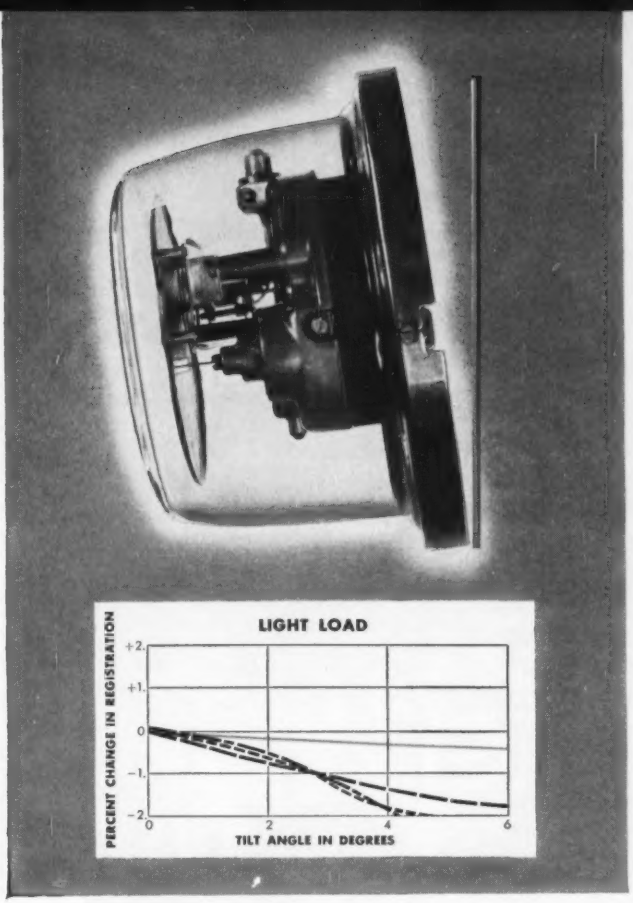
FORWARD



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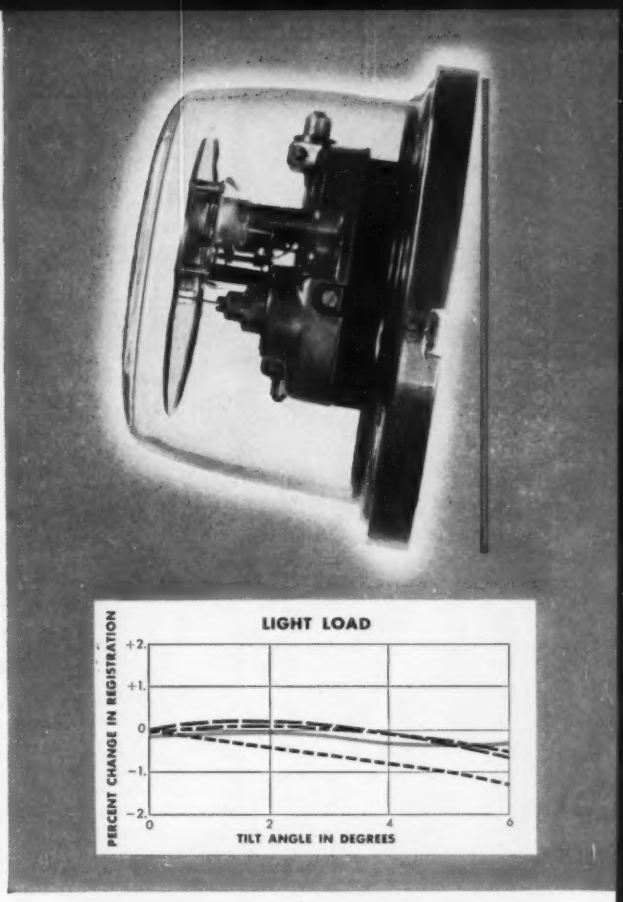


LEAST AFFECTED BY TILT

G-E MAGNETIC SUSPENSION SYSTEM SAVES YOU REVENUE NORMALLY LOST THROUGH TILT ERRORS

Any meter installed slightly out of plumb will give inaccurate readings which, in most cases, result in loss of revenue. By using General Electric meters with magnetic suspension the errors from tilt are virtually eliminated and the loss of revenue is negligible.

Recently a series of tilt tests were conducted at G-E laboratories. Both G-E meters with the "floating disk" and ordinary meters using conventional ball bearings to support the moving element were subjected to operation at various degrees of tilt. Here is what the tests revealed:

1. As the angle of tilt was increased on ordinary meters with ball bearings, additional friction resulted. This increased friction could result in substantial losses of revenue.

2. The magnetic suspension system of G-E meters developed no measurable friction when operated out of plumb . . . even as the angle of tilt was increased. Life of the G-E meters was not affected and only negligible tilt errors in registration resulted.

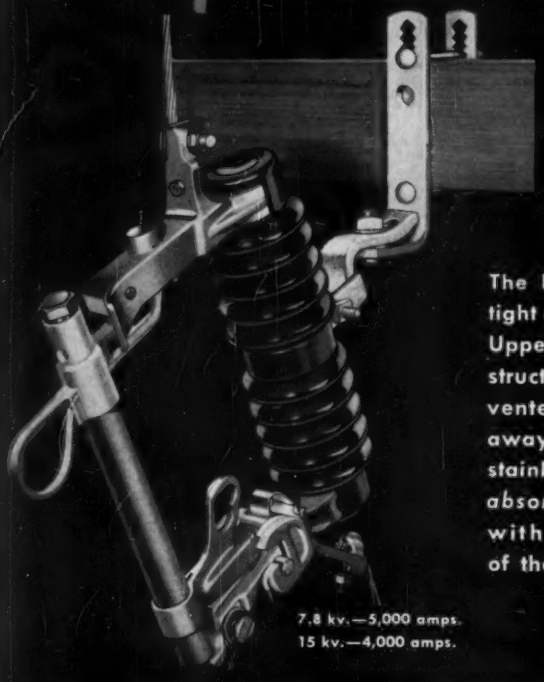
Virtual elimination of tilt errors is only one of many ways that G-E meters help pay for themselves time and again through more accurate measurement of all the energy you supply. For other important money-saving benefits—greater sustained accuracy, longer meter life with less maintenance and testing time, and elimination of bearing replacement—specify G-E meters of the I-50 family. . . . the only meters with the "floating disk."

For more information, contact your nearby G-E Apparatus Sales Office, or write General Electric Company, Section 621-7, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

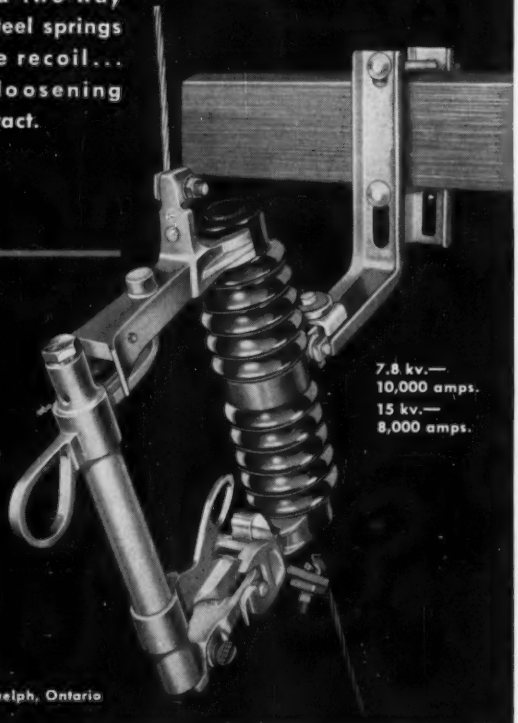
Takes the shock... protects the contact



7.8 kv.—5,000 amps.
15 kv.—4,000 amps.

KEARNEY
Heavy Duty Type "G" TRIP-OUT

The KEARNEY Type "G" remains as strong and tight as new . . . even after interrupting many faults! Upper contact has unique shock-absorbing construction that permits the fuse cartridge to be front-vented. Burning gasses are directed harmlessly away. And two-way stainless steel springs *absorb* the recoil... without loosening of the contact.



7.8 kv.—
10,000 amps.
15 kv.—
8,000 amps.

Extra Heavy Duty Type "G" TRIP-OUT

All the advantages of the Heavy Duty Type "G"—plus extra rugged fuse cartridge to withstand repeated high faults. Reliable interruption of low current faults as well. There's a fast, complete interruption—opening action causes Fuse link to be "whipped" out without depending on expulsion force.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue • St. Louis 10, Missouri • *Canadian Plant:* Guelph, Ontario

-305

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify KEARNEY
JAMES R. KEARNEY
The Mark of Quality
PRODUCTS

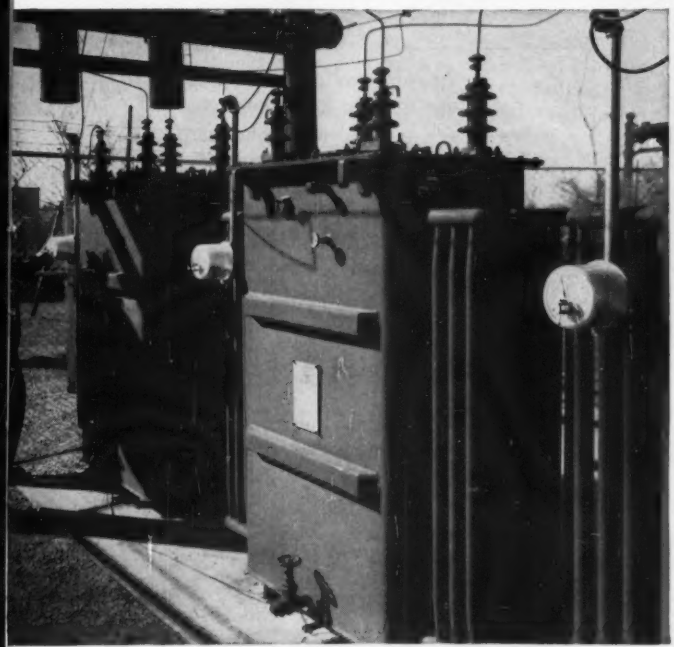
A V2JS VOLTMETER-WATTHOUR METER COMBINATION permanently installed at first or last customer from the transformer. Regular meter reader reports minimum and maximum voltage to Engineering Department.

COMPLETE TEST SET checks load and voltage at customer's premises —gives full information on circuit conditions at input to customer service, while continuing to record KWH consumption.

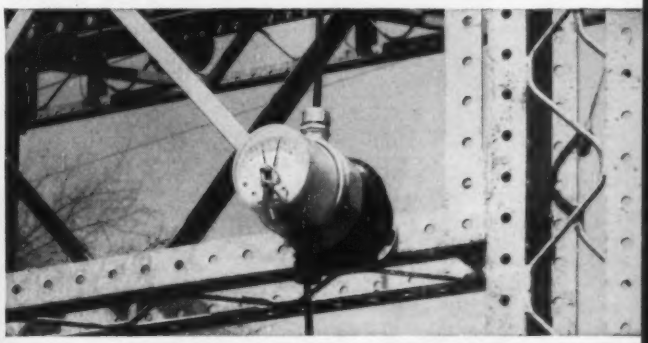
for better knowledge of your system ...use Lincoln Meters!

Indicating meters provide the low-cost way of obtaining complete knowledge of your system. They give continuous data of load, balance, and current values—on transformers, on feeders, at substations, at system check points. Lincoln Indicating Meters are simple in design and operation—flexible in application. Use the coupon below for detailed information on these economical aids to system betterment.

SANGAMO ELECTRIC COMPANY, Springfield, Illinois



LINCOLN ADN AMPERE DEMAND METERS, tied solidly in to the neutral, provide continuous knowledge of load and balance on 4WY banks of transformers. No instrument transformers are required.



THIS "HOT" TYPE AD-5 LINCOLN METER indicates amperes and gives balance on primary feeder circuits. Meter is insulated from ground with a post-type insulator and is arranged for hot stick reset.

SANGAMO ELECTRIC COMPANY, Springfield, Illinois

Please send me the information checked below:

- ☐ Information on Lincoln Voltmeters and Ammeters.
- ☐ Bulletin on Test Sockets.
- ☐ Booklet: "Solving Distribution Problems through Measurement."

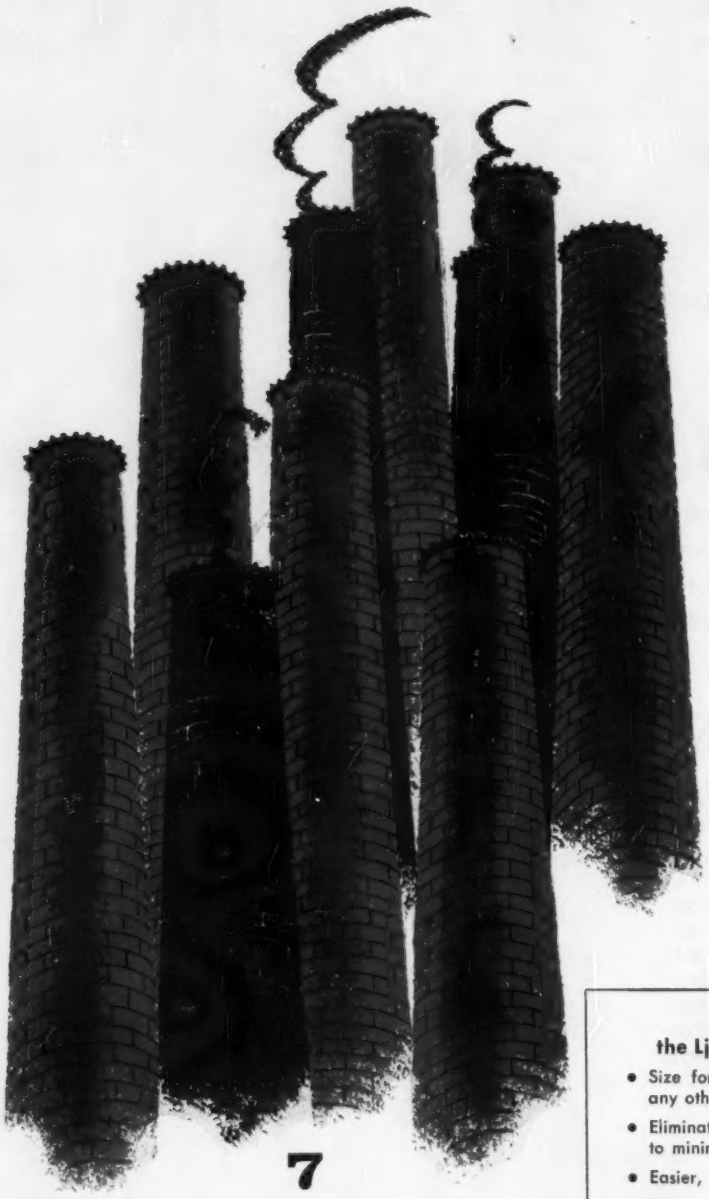
NAME_____

COMPANY_____

ADDRESS_____

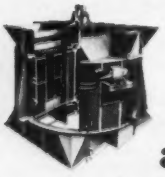
CITY_____ STATE_____

SM56-6



Advantages of the Ljungstrom Air Preheater

- Size for size, recovers more heat than any other type.
- Eliminates cold spots . . . keeps corrosion to minimum.
- Easier, faster to clean and maintain.
- Requires far less supporting steel and is quickly erected.



7 out of 10. . . air preheater installations are Ljungstrom®

MAXIMUM HEAT RECOVERY is one important reason. As a general rule, a height of one inch of the heating surface used in a Ljungstrom Air Preheater will recover about as much heat as one foot of length of the standard surface of conventional type air preheaters. For the interesting full story, send for a free copy of our 38-page manual.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

25TH ANNIVERSARY of MICROWAVE COMMUNICATIONS

...PIONEERED in 1931 by IT&T

Today, all the world-wide technical, manufacturing, installation and operating experience gained by IT&T engineers since the birth of microwave is now available in one great system—

Federal MICROWAVE

A new age of communications was born 25 years ago when IT&T engineers conducted the world's first successful demonstration of microwave . . . across the English Channel.

In the brief span of one generation microwave has spread all over the globe. In North America, the trail was blazed by *Federal* Microwave . . . supplying tens of thousands of channel miles . . . operated by pipelines, power utilities, telephone companies, municipalities, administrations, TV stations and others . . . bringing new speed and dependability to their communications, supervisory and control operations.

Whatever its needs . . . for today or tomorrow . . . industry can look to *Federal* Microwave with confidence, for no other system possesses such a long background of quality and performance . . . *"Certified by a World of Research."*

Scene of the world's first demonstration of the amazing possibilities in microwave communications . . . by IT&T engineers . . . from Calais, France, to Dover, England, in 1931.

Federal

A DIVISION OF IT&T

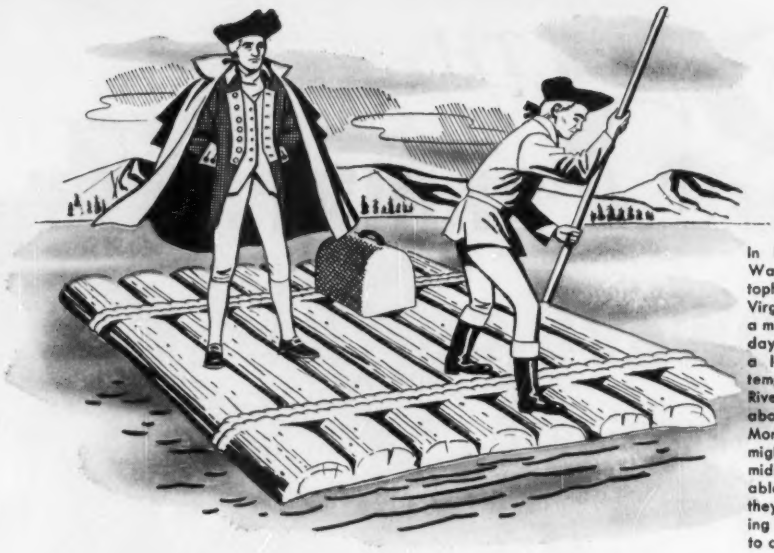
FEDERAL TELEPHONE & RADIO

For full information, write to Dept. H-717

Federal Telephone and Radio Company

A Division of INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
APPARATUS DIVISION • 100 KINGSLAND ROAD • CLIFTON, N. J.

In Canada: Standard Telephones and Cables Mfg. Co. (Canada) Ltd., Montreal P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., New York



In December of 1753, Major Washington and his guide, Christopher Gist, were returning to Virginia after having delivered a message to a fort near present-day Erie, Pa. The two men built a log raft on which they attempted to cross the Allegheny River at a point several miles above where that river joins the Monongahela River to form the mighty Ohio. Their raft upset in midstream, but the two men were able to swim to an island, where they spent the night before making a second, successful attempt to cross the stream.

IF GEORGE WASHINGTON CROSSED THE ALLEGHENY RIVER

His way would be lighted with POWER from Pole Star

DISTRIBUTION TRANSFORMERS

It has been over two hundred years since George Washington — who was then a major in the Virginia Militia — made his near-fatal crossing of the Allegheny River, at what is now Pittsburgh. If Washington were to cross the Allegheny tonight, using the Washington Crossing Bridge that now occupies the site of his earlier drenching, his approach to that span would be lighted with power from Pole Star distribution transformers.

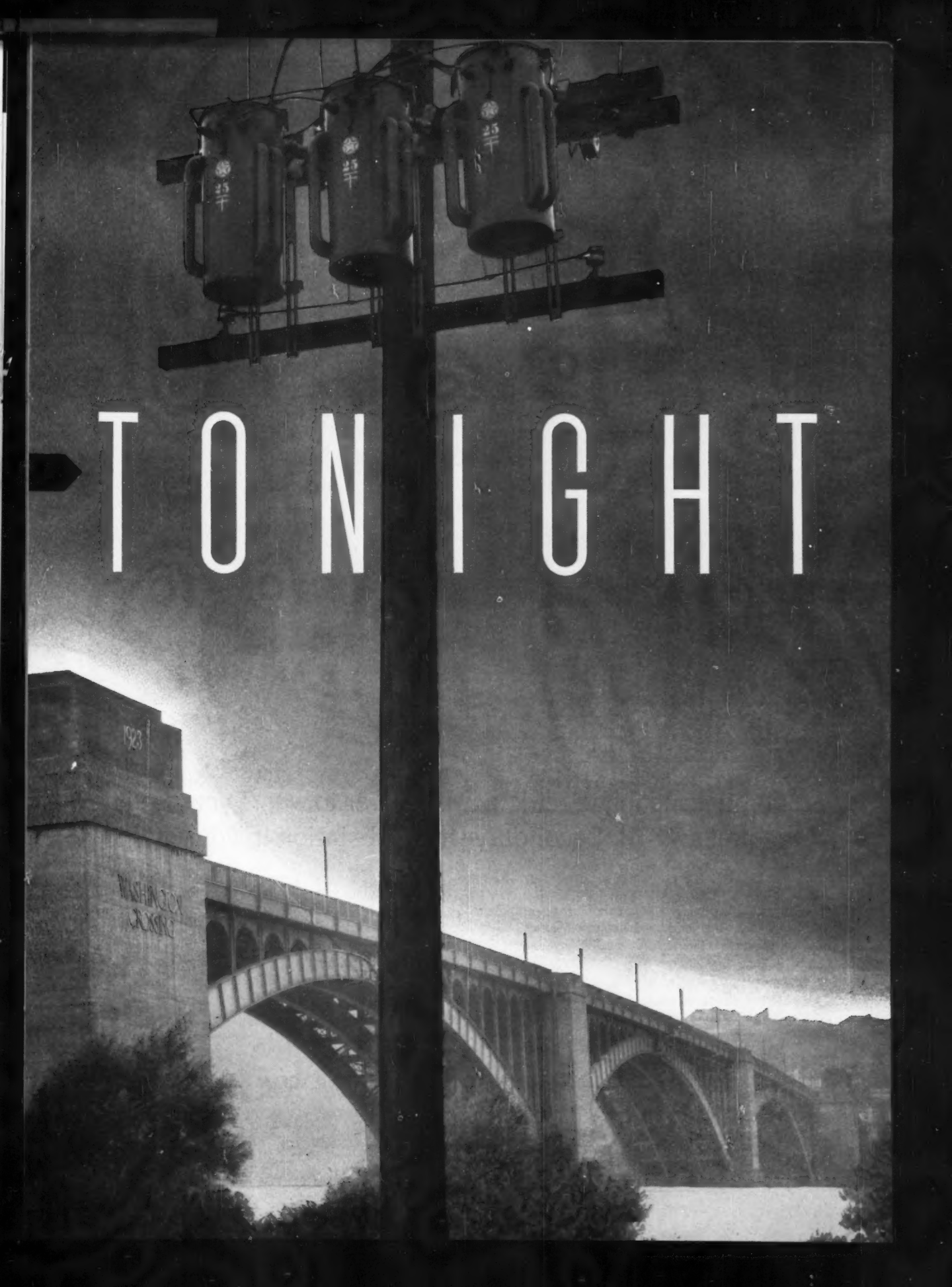
In fact, just about anywhere in the country that Washington might travel — and in this day and age he probably would explore most of it — he would be passing through areas in which Pole Stars serve as important links in electrical distribution systems. This widespread acceptance of Pole Star distribution transformers has taken place in the short period of only ten years — convincing proof that the Pole Star design, with the patented lap-on-top core, "has what it takes" for dependable, efficient service.

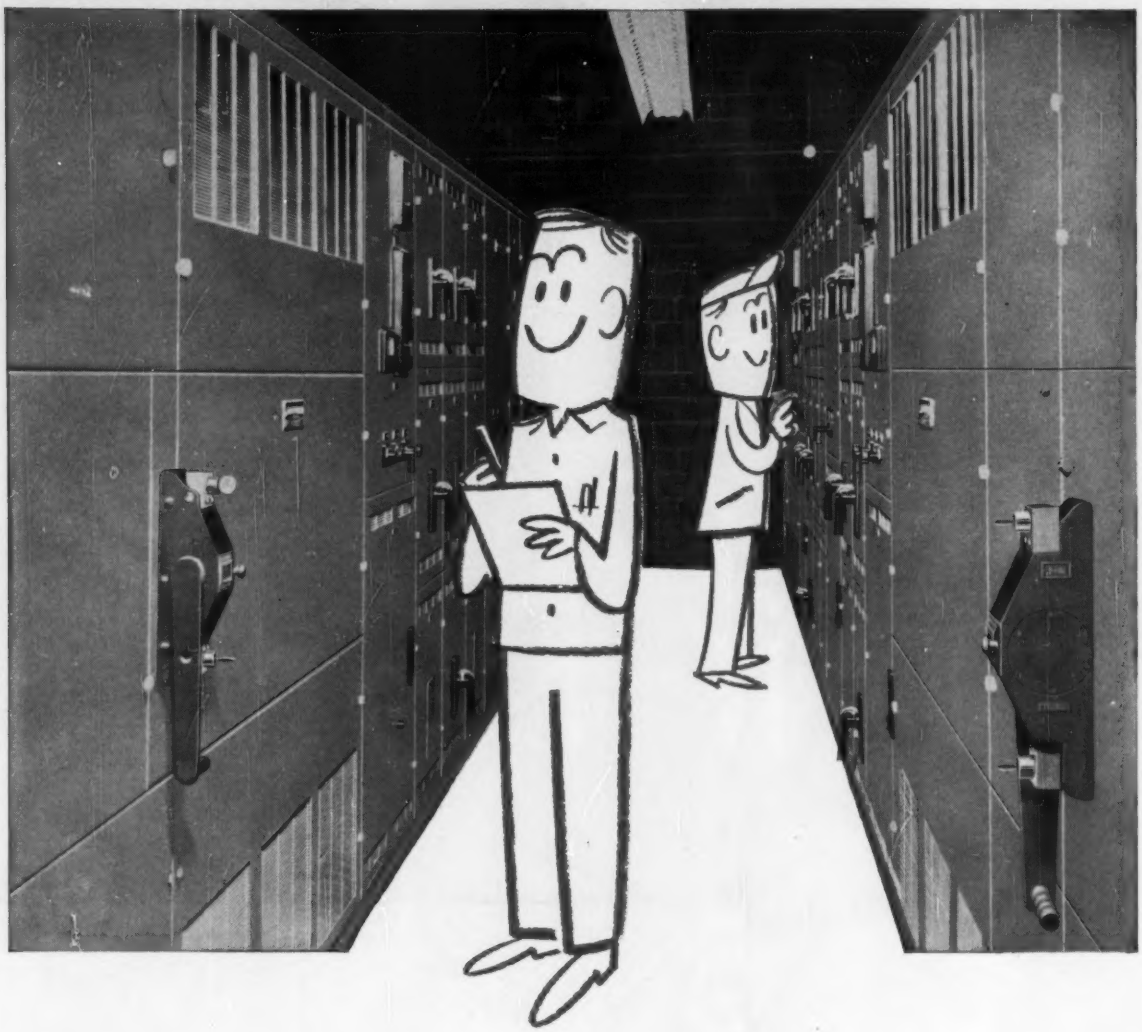
Pole Stars are available in all single phase distribution sizes from 3 through 500 kva, in voltages through 67,000 volts; Protected Pole Stars, from 3 through 100 kva, in voltages through 14,400 volts.

POLE STAR pt

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*


TONIGHT
1923



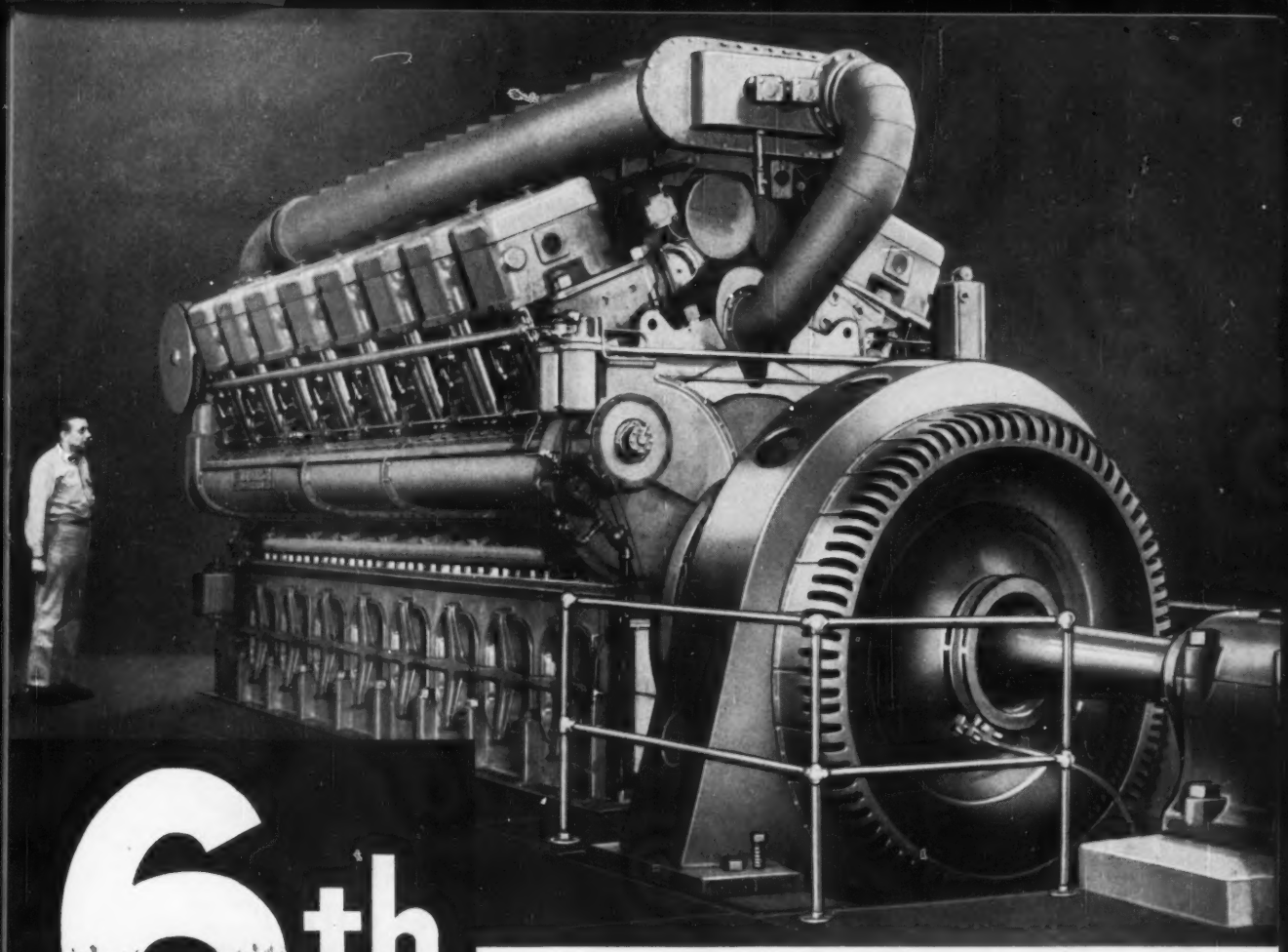
Bring dependable electric power nearer to where you use it —install an **I-T-E** Secondary Unit Substation in your plant

I-T-E Secondary Unit Substations make electric power more dependable, more economical. They bring higher voltages nearer the load, reduce power losses. They increase machine efficiency, reduce voltage drops inherent in long low-voltage runs. They save space—all necessary components are housed in one functionally designed unit. They protect plant personnel—all live parts are isolated and metal enclosed.

In addition, you save in delivery and installation time. All I-T-E Secondary Unit Substations are assembled, tested and shipped ready to install from one source of supply. And they are available for any application, indoor or outdoor, in any standard rating.

For complete information, contact your nearest I-T-E sales office. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY
Switchgear Division



6th NORDBERG ENGINE for Neodesha, Kansas

"HIGHLIGHTS" OF POWER PLANT GROWTH

1922—Installed 2 Nordberg 550 hp engines in Neodesha plant.

1934—Installed Nordberg 880 hp engine.

1946—Installed Nordberg 1620 hp engine.

1952—Installed Nordberg 1750 hp engine.

1956—Sixth Nordberg engine to be installed . . . a 16 cylinder V-type *Supairthermal*® Duafuel engine rated 3150 bhp, 2250 kw.

Dependable engine performance builds repeat orders . . . and a case in point is the fact that the City of Neodesha, Kansas, has now ordered its *sixth* Nordberg engine. As an example of the kind of performance these engines deliver, here are some of the figures taken from operating records kept on Neodesha's fifth Nordberg engine—a 1750 bhp, 1235 kw Duafuel® unit.

According to Everett Powell, Superintendent, Neodesha Electric & Water Plants, from February 14, 1952, the date this engine was put on the line to March 1, 1956, a period of just over four years, it has run 34,370 hours out of a possible 35,784 . . . which means that this engine has operated over 96% of its total installed hours without even removing a piston or cylinder head—a most outstanding record. In compiling this record, the engine has been producing approximately 88% of total plant production. With performance like that, it was natural that city officials again chose Nordberg to meet increased demands. Their sixth Nordberg unit, shown above is a 16 cylinder *Supairthermal* engine rated 3150 bhp, 2250 kw.

For engines to meet *your* power needs write Nordberg . . . *pioneer in the building of heavy duty engines from 10 to over 12,000 hp.*

NORDBERG MFG. CO., Milwaukee, Wisconsin

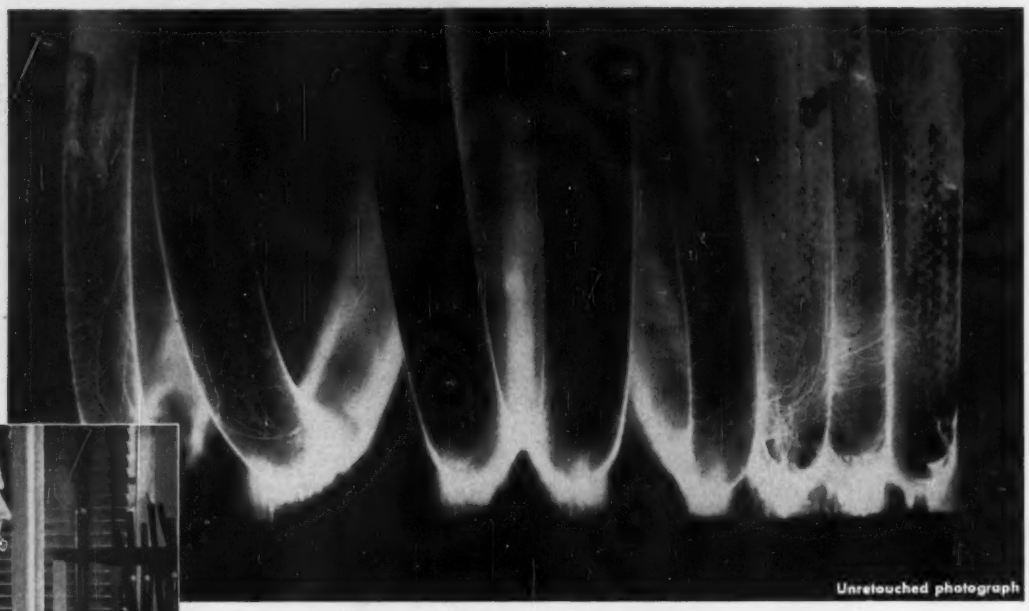
NORDBERG

DIESEL • DUAFUEL® AND SPARK IGNITION GAS ENGINES

© 1956, Nordberg Mfg. Co.

P456

GRIZZLY® POWER CABLES



Under High Ozone Attack resulting from excessive voltage outlast 9 other leading brands tested!

In United States Rubber Company's special wire and cable testing laboratory, scientific devices record how cables react under abnormally high voltage.

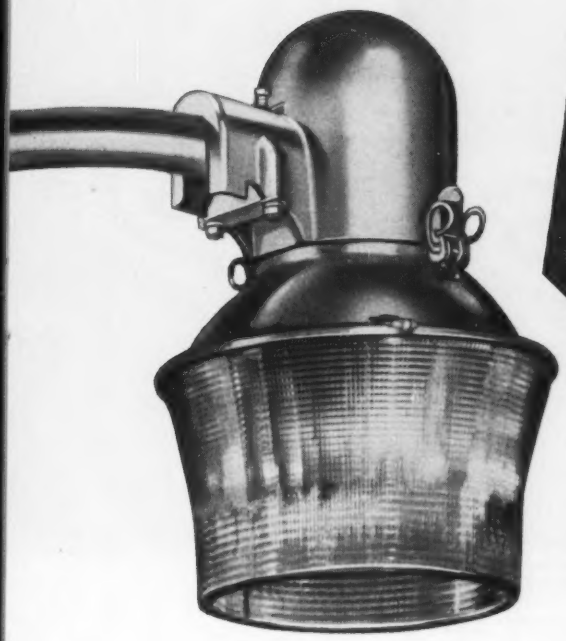
In this test, 6 samples of 5 KV unshielded U. S. Grizzly Power Cables were pitted against 26 other 5 KV samples made by 9 leading competitors. Lengths were bent into U-shapes, roughly 8 times the cable's over-all diameter. They were then placed upright on a grounded metal plate with bottom of "U" resting on plate. Then a conductor-to-plate potential of 40,000 volts was applied. The test was allowed to run until all cables failed, with elapsed time to failure carefully checked for each. The accompanying chart shows dramatically the overwhelming superiority of U. S. Grizzly Power Cable.

U. S. Grizzly Power Cables are obtainable at your "U.S." branch, distributor, or write us at Rockefeller Center, New York 20, N. Y.

Manufacturer	No. of samples tested	Elapsed time to failure—in hrs. Lowest value	Highest value
"U.S."	6	2941	6030
A	2	0	3
B	5	0	92
C	2	0	.6
D	3	12.5	144
E	3	300	490
F	2	30	46
G	6	.1	2509
H	2	0	0
I	1	25	25

Electrical Wire & Cable Department

United States Rubber



Aluminum reflector can be latched directly to a standard NEMA head. Since the Suburbanaire is open at the bottom, the refractor does not need to be removed for relamping.

L-M's new Suburbanaire has a modern, up-to-date daytime appearance.

How L-M's Suburbanaire Improves Residential Lighting, Cuts Maintenance

L-M's new open-refractor Suburbanaire is an outstanding improvement in residential area luminaires. The open glassware provides for excellent cooling, larger lamps, and easy re-lamping. In addition, the Suburbanaire has a pleasing daytime appearance.

The Holophane® refractor glassware is available in type I, standard type II, type II 4-way offset, type III and type V light patterns. The unit offers greatly improved lighting over open luminaires often used for neighborhood streets.

Check These Outstanding Features

L-M's Suburbanaire Is More Efficient—

- Specially designed for long life, low wattage, and clear and color improved mercury vapor lamps including the new 100 watt (3300 lumens) and 175 watt (6800 lumens). Accommodates incandescent lamps up through 6000 lumens. Integrally mounted head and ballast assembly available for use with HG lamps.
- Provides more light at higher angles, making it adaptable to wider spacings which are typical in residential areas.
- Glare is at a minimum, even with high beam candlepower at a high angle, because of the large glass area, which provides a beacon effect with large light source. The light is developed from the entire refractor, not just from the area next to the reflector.
- Has high utilization of light output and improved efficiency.

L-M's Suburbanaire Cuts Maintenance Costs—

- Eliminates the problem of trapped dirt and condensation which collect in enclosed units.
- Relamping can be done without removing glassware. In many cases it can be done from the ground with a lamp stick.
- Alzak® aluminum reflector is latched for easy attachment to standard NEMA head. V-band permits field replacement of glassware when necessary.

Ask the L-M Field Engineer or Street Lighting Engineer for more information on features of L-M's Suburbanaire luminaire. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

LINE MATERIAL
A McGRAW ELECTRIC COMPANY DIVISION
Street Lighting

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When ordering lighting equipment, protect yourself. Insist on quality products that meet the exacting requirements of EEI-NEMA standards (Edison Electric Institute and National Electrical Manufacturers Assn.)

BEFORE L-M V-shaped fluorescent lighting was installed in Grand Rapids, Mich., streets were dark and it was hard to see anyone crossing the street.

It is easier to see the railroad crossing with L-M's fluorescent luminaires. The large light sources produce an even white color over the area and eliminate glare.

L-M's V-shaped fluorescent luminaire provides a large, even light along the street and surrounding sidewalk area.

Some Other L-M Fluorescent Lighting Installations

Atlantic, Iowa
Bay City, Mich.
Chillicothe, Ohio
Crookston, Minn.
De Smet, S. D.
Detroit, Mich.
Hopkins, Minn.
Mountain Lake, Minn.
Nashville, Tenn.
Piqua, Ohio
Pulaski, Tenn.
Saginaw, Mich.
San Jose, Calif.
San Leandro, Calif.
Springfield, Mo.
Traverse City, Mich.
Union City, Mich.
Wisconsin Dells, Wis.

When ordering lighting equipment, protect yourself. Insist on quality products that meet the exacting requirements of EEI-NEMA standards (Edison Electric Institute and National Electrical Manufacturers Association).

LINE MATERIAL

A McGRAW ELECTRIC COMPANY DIVISION

AFTER installation of L-M fluorescent street lights in Grand Rapids, streets had a cheerful atmosphere. Improved visibility for both motorists and pedestrians and well-lighted sidewalks and shopping areas invite evening business.

Why Grand Rapids Selected L-M's New V-Type Fluorescent Luminaire

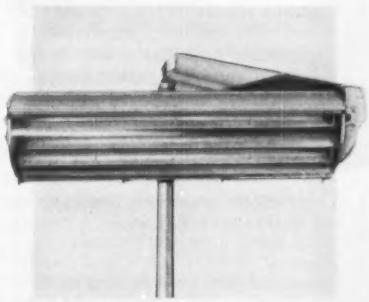
Better Visibility . . . Less Glare . . . High Light Output

L-M's modern V-shaped fluorescent luminaires produce better visibility and less glare for both motorists and pedestrians in Grand Rapids, Michigan.

The new luminaires produce a broad, evenly diffused light that greatly increases the scope of vision. This means that safety is increased; crime and vandalism are curbed; and well-lighted streets and sidewalks invite evening shopping.

Some Outstanding Features of L-M's V-Shaped Fluorescent Luminaire

- Each lamp has a separate reflector. This gives better, more accurate control; makes the unit far more efficient.
- Light is distributed over a broad area, giving good balance between building and road surface and providing better visibility.



L-M's modern V-shaped fluorescent luminaire is designed for better visibility and a lifetime of efficient, economical operation.

- Units have low power consumption and long life with little maintenance.
- Luminaire is easily accessible for installation wiring, cleaning, relamping.

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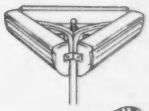
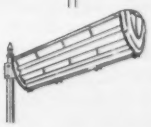
L-M's modern fluorescent luminaires are also available in these styles:



6-lamp delta-shaped for parking areas, railroad yards, etc.



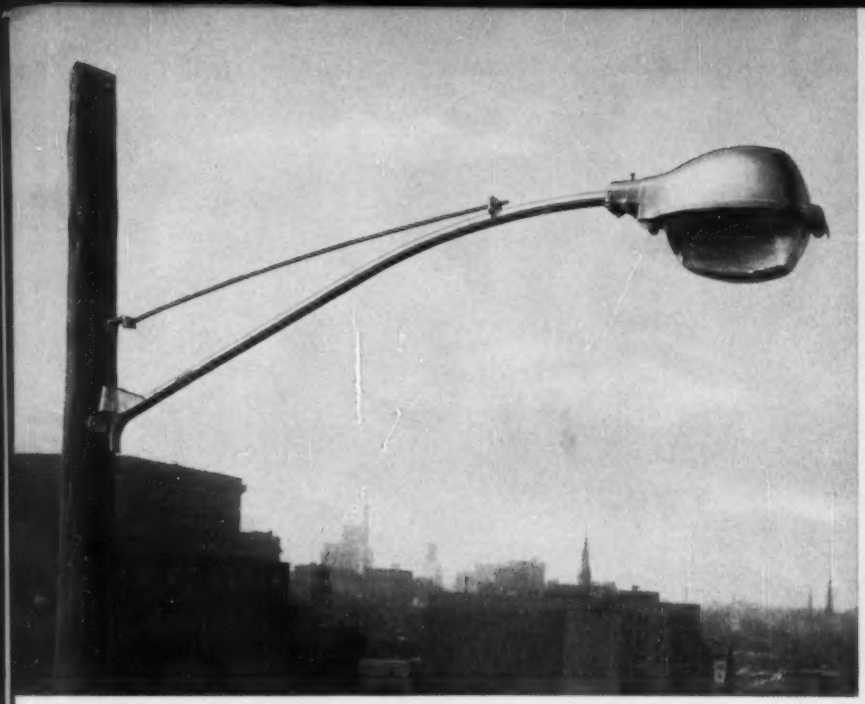
4-lamp bi-directional for parkways, streets, and entrance ways.

2-lamp uni-directional for underpass, perimeter, ramp, and flood lighting.

Application Service

L-M Street Lighting Engineers will cooperate with you in designing the best lighting system for your area. L-M offers the most advanced equipment and operating systems for incandescent, mercury vapor, and fluorescent street lighting. Ask your L-M Field Engineer or Street Lighting Engineer for more complete information and bulletins. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

Street Lighting



Guy rod, pipe and parts are all firmly packaged together. Storeroom space has been reduced considerably because it is no longer necessary to have a separate bin for each part.

Why L-M Luminaire Supports Are Easy To Handle, Easy To Store

L-M's complete line of steel or aluminum luminaire supports is shipped packaged, with guy rod, pipe and parts firmly strapped together. All threaded parts of each support are protected with a plastic coating. The pole fitting and brace support are welded to the bracket, which reduces the number of parts.

How Packaging Saves Time and Storeroom Space

Because all parts for L-M's luminaire support are packaged together, they can be stored as a unit, eliminating separate bins for each part. Parts are not lost in shipment or in the storeroom when packaged together. The correct components will always be sent to the job site.

L-M's luminaire supports are designed for—

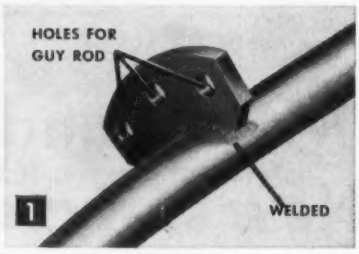
Appearance: L-M provides four harmonizing styles of supports so that several types can be used in the same installation, if desired. The supports are "upsweep" in design to give a handsome appearance.

Strength: Completely wind-tunnel-tested, L-M's luminaire supports are designed to withstand winds up to 150 M.P.H., to assure generous lateral strength. The supports can also withstand heavy non-sustaining vertical loads up to 250 pounds without collapse or rupture. The pole fitting and brace support are welded to the bracket to insure ample strength and minimize vibration.

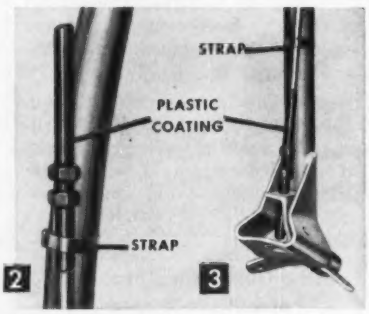
Meet Proposed EEI-NEMA Standards: L-M supports meet the new proposed EEI-NEMA standards for strength and minimum pole mounting requirements. The minimum pole space advantage makes these supports particularly desirable for joint-use poles.

Complete Line of Luminaires and Supports

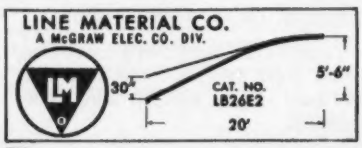
L-M supports are available in lengths up to 20 feet, in steel or aluminum. L-M also offers a full line of street lighting luminaires—incandescent, mercury vapor, and fluorescent—and complete street lighting application engineering service. Ask the L-M Field Engineer for information and bulletins. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



Support for guy rods is welded to the bracket. This reduces the number of parts, adds strength to the bracket, and minimizes vibration.



Nuts and threaded parts are covered with a plastic protective coating. Brace is firmly strapped to the bracket to facilitate shipping, handling, and storage.



4 Each L-M luminaire support is identified with an easy-to-read label which lists the catalog number and illustrates the mounting, length, and rise dimensions.

When ordering lighting equipment, protect yourself. Insist on quality products that meet the exacting requirements of EEI-NEMA standards (Edison Electric Institute and National Electrical Manufacturers Association).

LINE MATERIAL

McGRAW ELECTRIC COMPANY DIVISION

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Street Lighting

ROADWAYS AND PARKING AREAS are lighted with L-M Spherolites® with mercury vapor lamps.

L-M Lights Roadways, Runways, and Ramps at General Mitchell Field

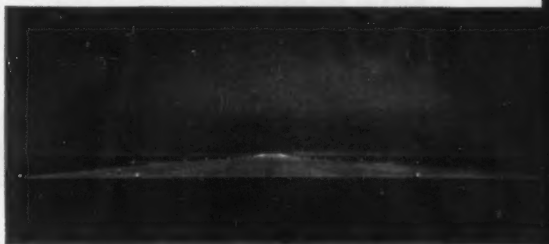
Milwaukee County's magnificent new air terminal at General Mitchell Field provides the latest facilities for comfort, convenience, and service of passengers flying in and out of the big midwestern metropolis.

The newly dedicated terminal is a beautiful low modern building nearly 1000 feet long. The arriving traveler finds such modern conveniences as automatic doors, escalators, the latest in lighting, a wide range of facilities for his comfort and convenience. The new airport is not only a great focal point for Milwaukee County but also a model for airline terminals everywhere.

Approach roadways and the huge 2000-car parking area are lighted by L-M mercury vapor units on steel poles. Loading ramps are illuminated by L-M's latest fluorescent luminaires, whose broad light sources provide ample illumination with a minimum of glare to incoming pilots. Runways for planes are marked with L-M's high intensity Thermal Beam™ runway lighting units.

L-M provides a complete line of incandescent, mercury vapor, and fluorescent lighting and equipment for outdoor installations—for street lighting, airports, roadways, shopping centers, parking areas. L-M's runway lights are the culmination of years of development by the leader in airport runway lighting. For complete information on L-M products and services, ask the L-M Field Engineer or Lighting Engineer; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

RAMP LIGHTING—154 of L-M's new fluorescent units provide a high level of illumination without glare to pilots.



RUNWAY LIGHTS—L-M's Thermal Beam units compensate in both intensity and direction for fog and other low-visibility conditions, by toeing in as intensity is stepped up, toeing out as intensity is lowered in clear weather. Smaller L-M lights light taxiways.

LINE MATERIAL

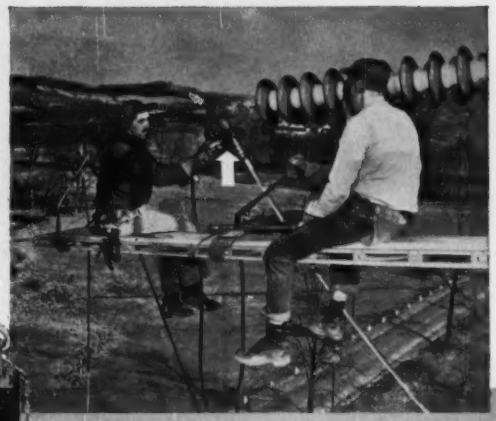
Street and Airport Lighting

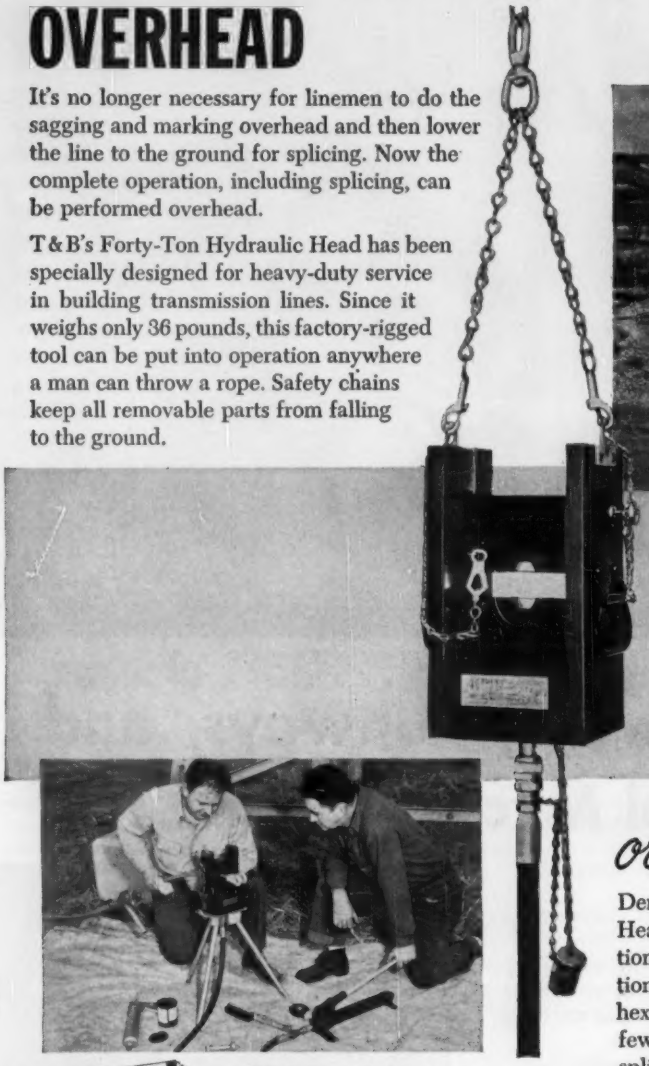
Now *ONE* portable tool makes transmission line splices

OVERHEAD

It's no longer necessary for linemen to do the sagging and marking overhead and then lower the line to the ground for splicing. Now the complete operation, including splicing, can be performed overhead.

T&B's Forty-Ton Hydraulic Head has been specially designed for heavy-duty service in building transmission lines. Since it weighs only 36 pounds, this factory-rigged tool can be put into operation anywhere a man can throw a rope. Safety chains keep all removable parts from falling to the ground.





T&B's Forty-Ton Hydraulic Head, Cat. No. 21940, specially designed for transmission line building.

or ON THE GROUND

Demountable legs hold T&B's Forty-Ton Hydraulic Head at convenient working height when installations are being made on the ground. During operation, hardened steel dies compress fitting and cable hexagonally into one homogeneous mass . . . all in a few seconds. The same die set installs tension splicers, dead ends, loop splicers and taps, tees and terminals.

Modern hydraulic design has virtually eliminated the need for maintenance. However, field maintenance is simple and practical. The 21940 Installing Head can be completely disassembled and reassembled in less than one-half hour with these common tools: screw driver, Allen wrench, and mallet.

T&B Bulletin 70 gives a detailed description of the Forty-Ton Hydraulic Head as well as complete lines of T&B connectors, tools, and accessories for transmission line building. Send for FREE copy.

LOOK FOR THIS SIGN —

AUTHORIZED DISTRIBUTOR T&B ENGINEERED

IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T-418

THE THOMAS & BETTS CO.

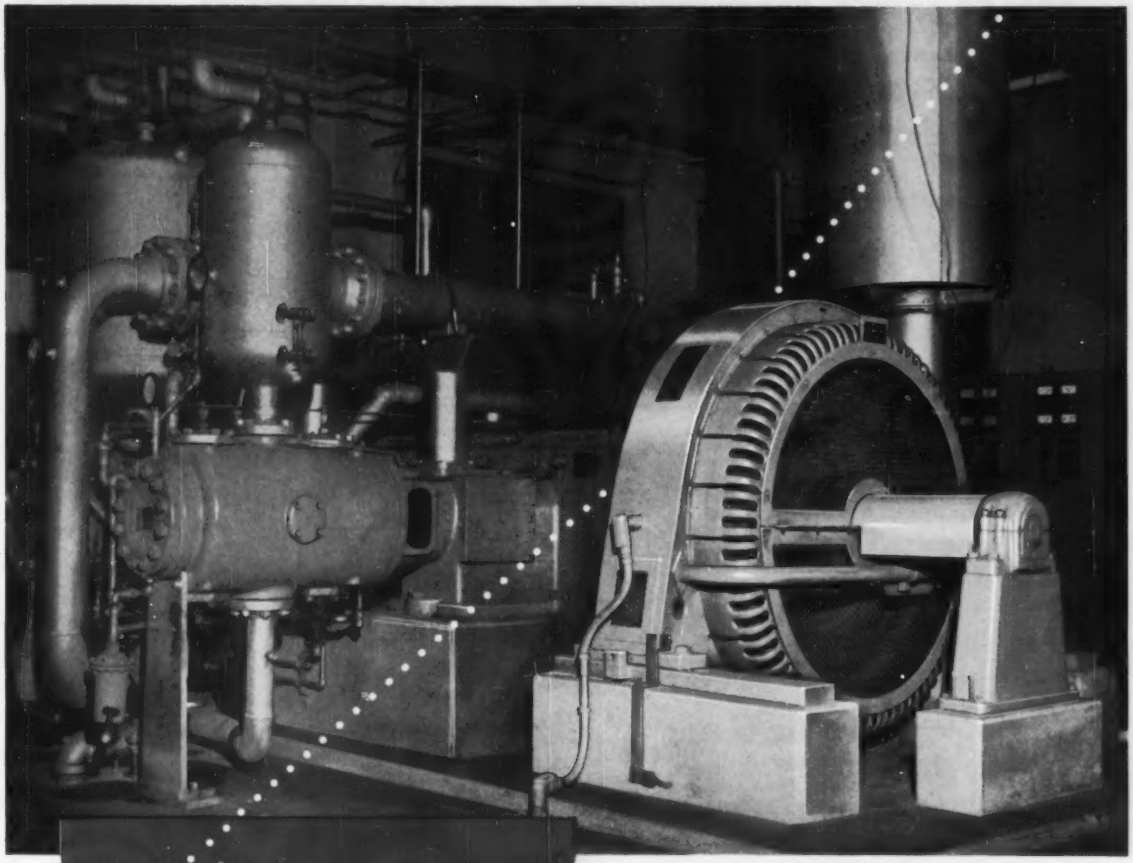
INCORPORATED

14 Butler Street • Elizabeth 1, New Jersey

Thomas & Betts Ltd., Montreal, P.Q., Canada

MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

On big, important compressor drives, like this



ELLIOTT SYNCHRONOUS MOTORS

ONE OF THE WORLD'S LARGEST SOOT BLOWER COMPRESSOR INSTALLATIONS is located in the famous Joppa Steam Electric Station of Electric Energy, Inc. There are six giant soot blower compressors, like the one pictured above — all driven by large Elliott 800-hp, 400-rpm synchronous motors. These motors are engine type with modern split-rotor construction. As is the case with all Elliott synchronous motor installations, the application of the motors was done with great care and consideration of all the complexities which accompany modern compressor drives. Elliott experience in compressor drives of all sizes and types is second to none, as attested by hundreds of successful installations. Ask your Elliott field engineer or write to Elliott Company, Ridgway, Pa., for full details.

ELLIOTT Company

RG-7

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS • EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

To Serve Better - Electrically

Now...a KUHLMAN transformer factory

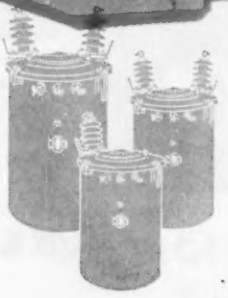
Each Factory Can Better Solve Your Transformer Problems With Efficient Regional Production Scheduling, Warehousing and Servicing.

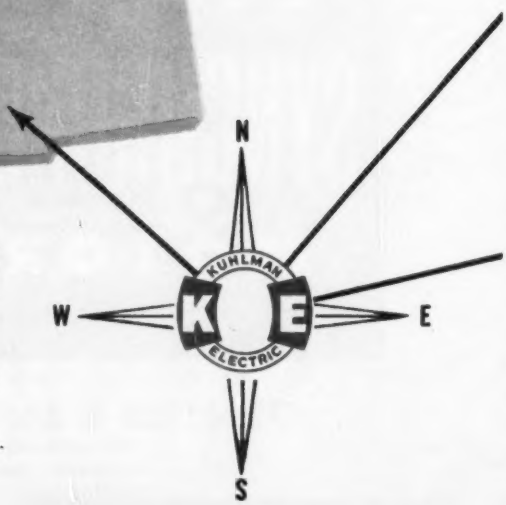
You'll get faster transformer deliveries—improved regional manufacturing and warehousing—more personal factory-to-customer service from the newly expanded KUHLMAN factory in your area.

This expansion of regional service and manufacturing is the result of a growing preference for KUHLMAN quality by many of the country's leading utilities. In fact, customer acceptance has approximately doubled KUHLMAN'S factory floor space in the last four years. Today, three independent producing factories—like the one in your area and 31 finished product distribution centers with 51 sales offices stand ready to serve you nationally—and by regions.

Ask your local KUHLMAN representative exactly how he can put KUHLMAN'S new regional manufacturing and distribution facilities to work for you. He'll be happy to explain, and with all of us, extend to you a most cordial invitation to visit your regional KUHLMAN plant for a friendly plant tour.

SALINAS, CALIFORNIA . . . serving the eleven Western states is one of the nation's most modern transformer factories, producing a full line of distribution transformers.





in your area

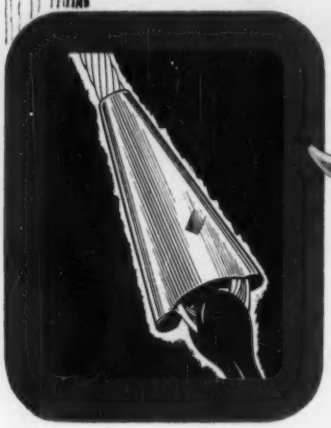
BAY CITY, MICHIGAN . . . located in the heart of the industrialized Middle West and Northeastern United States, this KUHLMAN factory has a 62 year old record of service to industry.

CRYSTAL SPRINGS, MISSISSIPPI . . . both serving and contributing to the development of diversified Southern industry, this KUHLMAN factory produces a complete line of power and distribution transformers.

KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

Problem solving is our business



SIMPLE BUT EFFECTIVE

NEW PLP ZINC COW GUARD SOLVES BACK-SCRATCHING PROBLEM IN FARMER JONES' PASTURE

• Guy wires are good back-scratchers, but may cause trouble. Pedigreed cattle, with identification tags and chains, are apt to get snagged by clamps, loose "pigtails" of strand or in anchor loops.

This poses a problem in customer goodwill for the power company, a time-consuming headache for Farmer Jones, and discomfort for the cow.

Because Preformed Line Products Company manufactures PLP Guy-Grips* the ultimate in guying efficiency, appearance and "streamlining"—the problem was brought to us. The answer: the new PLP Cow Guard, a heart-shaped zinc protector. It snaps easily into position, completely covers the loop of the Guy-Grip.

What's more, zinc contributes further to corrosion protection; not only for the guy assembly, but for the eye of the anchor rod. The resulting installation is simple, but effective.

The new zinc Cow Guard is only one example of PLP practical answers to realistic field problems. That's our business—progressive ideas, backed by creative engineering, laboratory and field testing. Together they spell better products. Why not call a PLP Representative today?

** Made in accordance with or for use under one or more of the following U. S. Patents: 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.*

PLP

PREFORMED LINE PRODUCTS COMPANY

5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

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ELECTRICAL BUSINESS OUTLOOK

Electrical World
JULY 23, 1956

Electric appliance sales in 1956 will run at least as high as '55 and possibly a bit higher. In the first six months retail appliance sales held up fairly well. Probably because less of the consumer durable goods dollar went for autos. The last half of the year should be even better. New appliances and remodeled old appliances will be on dealer's shelves for the Christmas season—and consumers will have more money in their pockets than ever before. Consumer disposable income is currently running 2.2% higher than the $279 billion annual rate reached at the end of last year. By the end of '56 it should be 3.3% higher.

• • •

The steel strike, if it runs longer than 30 or 40 days, will probably stimulate appliance sales even before the fall buying period. A longer strike will mean possible shortages later on, bringing with it the chance of higher prices. If consumers get worried, they could start a run on this market.

Air conditioners, dishwashers and clothes dryers are pacing appliance sales so far. Chances are each of these will exceed their '55 sales figures. In the first five months of this year manufacturer's sales of dishwashers were 47% higher than the same period last year and electric clothes dryers were up almost 18%. If these percentages hold through the remainder of the year. . . .

Utility distribution lines will be carrying an added 1 billion kwhr a year for these appliances alone. If industry estimates of air conditioners sales are met, you can add another 1.3 billion kwhr.

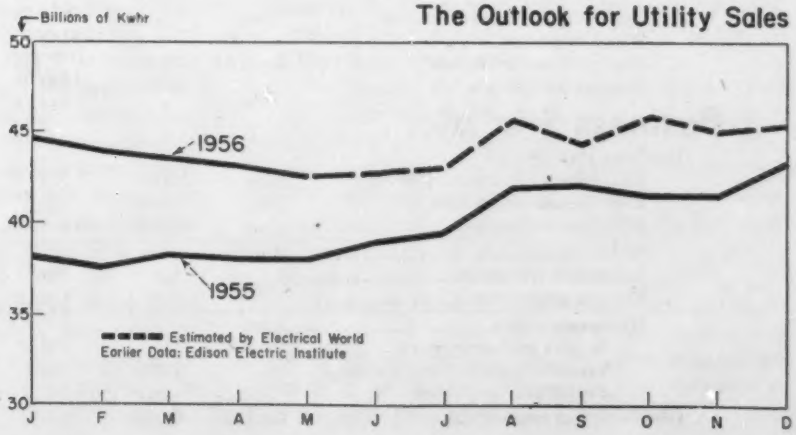
The sluggish residential construction picture is one reason appliance sales haven't boomed over last year. Currently, housing starts are running about 300,000 below last year's record 1.4 million starts with little hope for improvement.

• • •

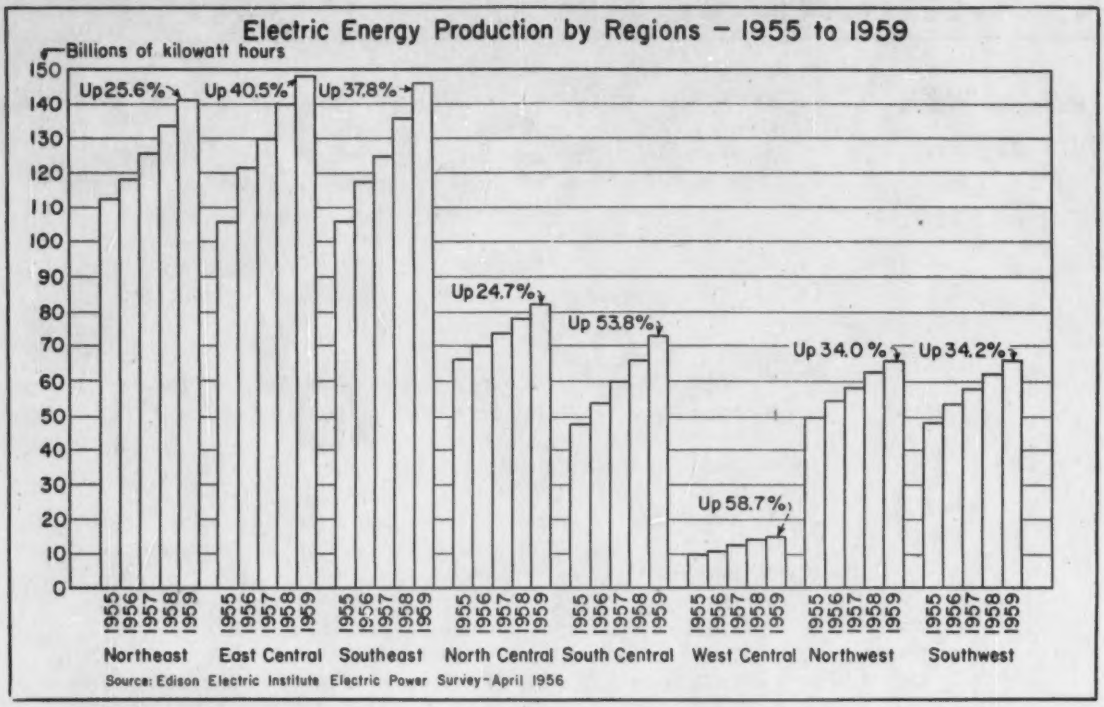
Chances for a general crude oil price hike this year are rapidly diminishing. An over supply of gasoline inventories is given as the reason. Industry spokesmen feel that if a price hike does come this year it will have to be between August 1 and September 30—the period when gasoline stocks should be lowest.

Utility sales are running ahead of EW estimates (below). March and April were about 3.1% higher while preliminary May figures are up 0.9%.

The Outlook for Utility Sales



STATISTICS



Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	April	116.78	116.56	105.30	10.9
Peak—Class I Systems, million kw	April	91.4	92.3	82.4	10.9
Estimated Dec. '56 Peak, million kw	April	105.88	105.68	103.39	2.4
Production—billion kwhr	April	47.49	50.34	42.03	13.0
Hydro		11.55	11.78	10.46	10.4
Fuel		35.94	38.56	31.57	13.8
Sales—billion kwhr	April	44.51	45.36	39.53	12.6
Residential		11.82	12.42	10.60	11.4
Commercial		6.70	6.84	6.15	8.9
Industrial		23.53	23.69	20.42	15.2
Other		2.46	2.40	2.36	4.2
Fuel Consumption	April				
Coal—million tons		11.95	13.39	10.12	18.1
Oil—million barrels		5.76	6.22	5.68	1.4
Gas—billion cu. ft		89.72	85.17	92.82	−3.3
Net Income Class A & B Co's—$ million	April	115.46	117.46	104.90	10.1
Residential Customers—millions	12 mos.	44.76	44.67	43.51	2.9
Revenue per kwhr	ended	2.62¢	2.63¢	2.67¢	−1.9
Avg kwhr per customer	April 30	2,838	2,819	2,623	8.2
Avg annual bill		$74.36	$74.12	$70.01	6.2

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	May	142	143	138	2.9
ENR Construction Cost	July	145.6	145.1	138.4	5.2
BLS Cost-of-living	May	115.4	114.9	114.2	1.1
NEMA Sales	April				
Insulation materials		163	168	160	1.9
Electric appliances		111	120	102	8.8
Wholesale prices	April				
Motors and generators		130.4	126.9	120.5	8.2
Transformers and regulators		135.3	133.1	127.3	6.3
Switchgear and fuses		149.0	147.8	135.5	10.0
GNP—annual rate—$ billion	1st Qtr.	398.5	397.3	375.3	6.2

Your Business

Management on its toes. Kenneth C. Long, president, Dayton Power & Light Co, is a man who likes to find out things first hand. When vacationing recently in Florida, Long knocked on the door of a shareholder in Coral Gables and introduced himself.

"Yours was the only dissenting proxy we received at our annual election," said Long, "and we wondered what you felt we were doing wrong."

The shareholder replied sheepishly, "I really didn't have any reason. I just thought it might be a good idea to cast a negative vote to keep management on its toes."

• • •

Television everywhere. Two McGraw-Hill editors just back from Russia report that TV seems to be catching on there at a great rate. Sets are much more reasonably priced than other consumer goods. And TV antennas are sprouting out on the most lowly rural hovels.

Of course, the antennas are no sure guarantee that there is a TV set in the house as we have discovered in the U. S. A manufacturer's survey in the U. S. earlier this year disclosed that 7.3% of the homes with antennas have no TV sets. Furthermore, 12.1% of the cars with aerials have no radio sets. Right now the manufacturer is laying plans to market dummy antennas for the TV-less home and the non-radio car. This raises the question as to whether the Russians have beat us to the draw in putting the dummy aerials on the market.

"Gentlemen—I think we've got the problem licked of how to get into those tight spots!"

But neither the U. S. nor Russia can quite beat the Niagara Peninsula-Hamilton-Toronto areas of Canada where, a Canadian manufacturer asserts, TV receivers now outnumber bathtubs and telephones.

• • •

Sidewalk superintendents are those kibitzers who keep a close eye on construction jobs. You can see them lined up along the railing of any new job as soon as the first power shovel goes into operation. One of the most harried men we ever met got that way by simultaneously "supervising" four large jobs in Washington. But the point we're getting around to is that the Los Angeles Chamber of Commerce now issues cards to the bonafide sidewalk superintendents in that city, although qualifications are strict.

Your Health—A Cause of Aching and Stiffness

REX H. WILSON, MD, Medical Director, B. F. Goodrich Co

Almost everyone complains of aching and stiffness at times. Probably it is due to osteo-arthritis. This common form of joint disease is due to wear and tear. As you move about, you use your joints. Overweight, poor posture, deformities and excessive use of the joints cause them to wear and degenerate even faster. Ball players may have it in their finger joints. The joints become irregular and narrow. Bone spurs and ridges form. Sometimes the joint is so destroyed that it can no longer function. Infection is not a cause.

Most people have osteo-arthritis for many years before they realize it. Occasionally it is first seen on an x-ray taken for a different purpose. Sooner or later the joints become stiff and painful, especially upon arising or after excessive exercise. Sometimes a blow or a wrench causes the joints to become swollen and painful. Eventually there may be joint deformity with persistent swelling and pain. The joints of the hands, spine, hips, and knees are involved most frequently.

The disease is slowly progressive. Acute "flare ups" occur with increasing severity and frequency.

There is no specific therapy for the disease. Rest, heat, and aspirin help most patients. The function of a deformed joint can be improved by the orthopedic surgeon. In some cases of hip joint deformity a functioning joint can be created by using plastic or metal inserts.

Osteo-arthritis is the disease of everyone. Do not worry about it because you will not be crippled from it. It can be used as an excuse to visit a health spa or to go to Florida in the winter time. Just take in your stride the fact that time marches on.

WASHINGTON COMMENT

Gore Bill Raises Questions, Criticism

Measure, termed an 'utterly useless piece of legislation', is seen as burden to taxpayers, wedge to put government into nuclear power business

When the Joint Atomic Energy Committee held hearings on legislation proposed by Sen Albert Gore (D-Tenn.,) to have the government build nuclear power reactors, acting Atomic Energy Commission Chairman W. F. Libby, in a statement, said:

". . . No substantative legislation is necessary to authorize the commission to construct full-scale demonstration reactors." But the joint committee chose to draft a piece of legislation instructing AEC to build such reactors, and at a cost of $400 million to the American taxpayers.

The reactor bill as passed by the Senate differs considerably from the original Gore measure, AEC spokesmen argue. It does little that can't be accomplished under existing law. But it does tell AEC to spend more money faster. And it tells AEC to get into the power business, something the commission and the Administration had been trying to avoid.

An acceleration of the nation's atomic power effort could have been achieved without the necessity of legislation, say the Gore Bill critics, and certainly at less cost.

Sen Bourke B. Hickenlooper (R-Iowa), member of the joint committee, has described the measure as an "utterly useless piece of legislation." Hickenlooper also noted that it represents an opening wedge for putting the government into the nuclear power business.

While the bill is supposed to avoid the public-versus-private power issue, the door is by no means closed to this issue at some future date. The preference clause controlling the distribution of electricity would certainly take effect once commercial power is available.

The original Atomic Energy Act of 1954 had as one of its objectives developing American industrial capability in the atomic energy field. The present bill reverses this direction, putting emphasis again on government effort.

Another of the original objectives was to gain the benefit of the cost cutting incentives of private industry. It is debatable what value to industry AEC experience will be under the new bill in developing quickly economic nuclear power. AEC costs will bear no relation to costs under private industry management. Particularly important in this connection is the cost of fuel reprocessing.

The new measure completely ignores another aspect of the nuclear power picture. This is the highly important and basic metallurgical research under way and which must be completed before the atomic power program can make real progress. In closed session testimony, subsequently released, AEC Reactor Chief W. Kenneth Davis touched on this problem. In connection with the aqueous homogenous reactor (a type AEC is instructed to consider under the new legislation), Davis noted that it would be impossible to build an economic unit without finding materials which will take the corrosion that concentrated solutions of uranium creates.

Finally, although the question was raised in the hearings, no one has yet defined any national goal of what is required in the nuclear power field to meet or maintain the nebulous need for so-called world leadership. This omission apparently has been recognized in the proposal by Rep J. E. Van Zandt (R-Pa.,) to form a commission to make recommendations along these lines.

TECHNICAL NOTES

Protection of a transmission line by shield wires is determined largely by the first 4 μsec of lightning discharge.

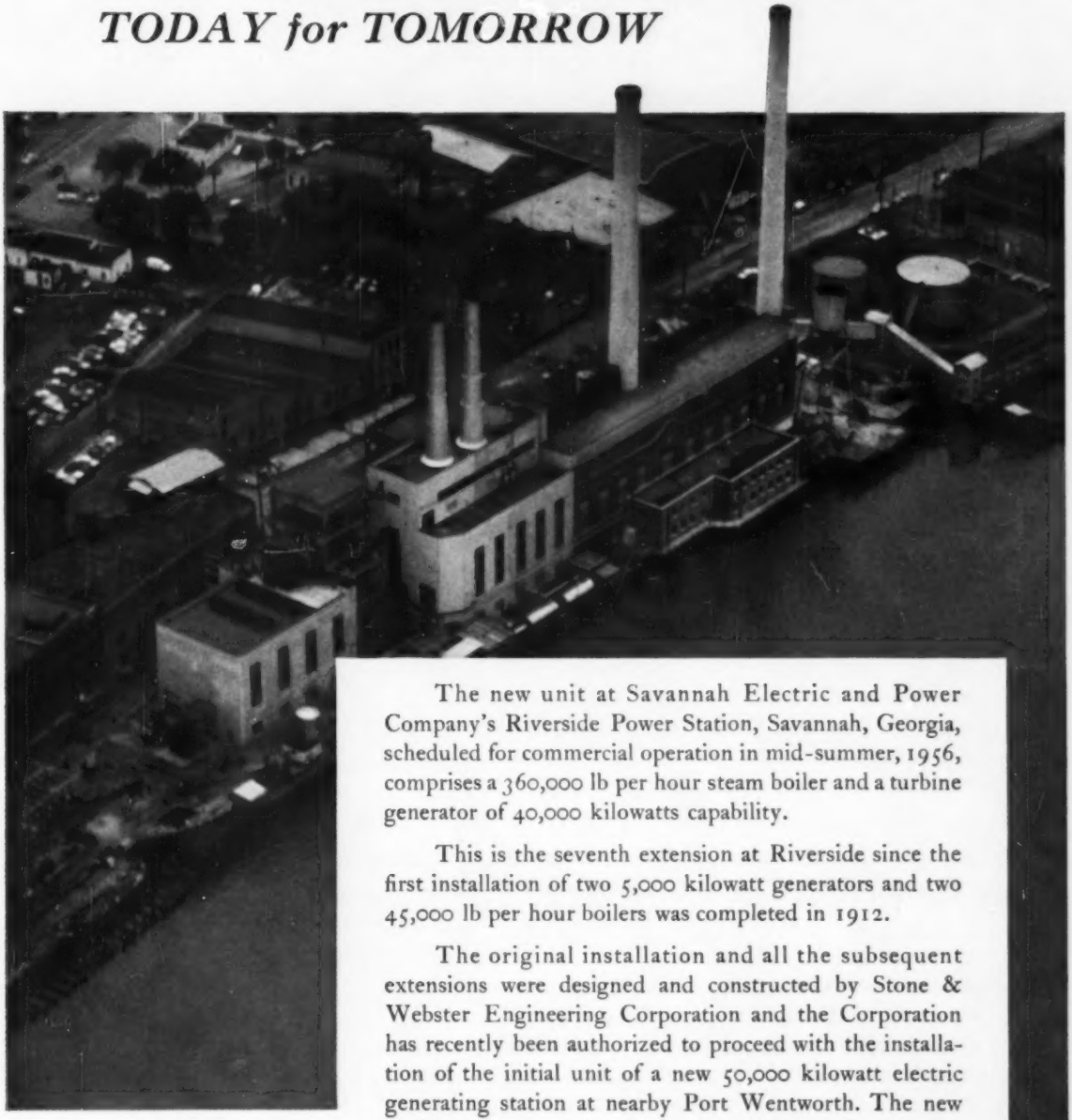
Nuclear reactors will produce 20 lb of fission products per day, equivalent in radioactivity to tens of tons of radium, in U. S. by 1965.

Overvoltage passed through step-up transformer by magnetic or capacitative coupling cannot reach a value high enough to overstress generator insulation, according to transient analyzer studies and utility experience.

Centralized hydrogen supply provides operating savings in replacing hydrogen lost through sealing systems in generating plants with four or more units.

Cable ratings must be reviewed frequently for operating economy with fluctuating costs and growing loads. Comparing only incremental costs of adjacent conductor sizes guards against errors.

SAVANNAH ELECTRIC PREPARES
TODAY for TOMORROW



The new unit at Savannah Electric and Power Company's Riverside Power Station, Savannah, Georgia, scheduled for commercial operation in mid-summer, 1956, comprises a 360,000 lb per hour steam boiler and a turbine generator of 40,000 kilowatts capability.

This is the seventh extension at Riverside since the first installation of two 5,000 kilowatt generators and two 45,000 lb per hour boilers was completed in 1912.

The original installation and all the subsequent extensions were designed and constructed by Stone & Webster Engineering Corporation and the Corporation has recently been authorized to proceed with the installation of the initial unit of a new 50,000 kilowatt electric generating station at nearby Port Wentworth. The new station is part of the Company's program for keeping ahead of the area's rapidly increasing industrial and residential power requirements.

Eighty per cent of the Engineering Corporation's construction work since 1889 has been in the nature of "repeat orders" from previous clients.

Write or call for our new booklet, "How Stone & Webster Engineering Corporation Can Help You".

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"CRESTOGRIP"

The NEW Utility Plier

BY CRESCENT

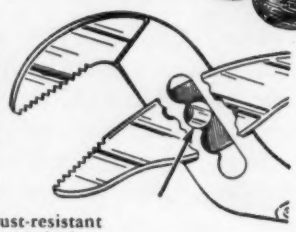
30% THINNER
TWICE AS STRONG
GRIPS LIKE A PIPE WRENCH

CLEAN, SHARP TEETH
FLUSH RIVET NO PROJECTIONS
BOX JOINT ADJUSTABLE TO 4 POSITIONS UP TO 1½" CAPACITY
EXTRA THIN—ONLY ½" AT THICKEST POINT
NON-SLIP CHECKERDOT KNURLING
P-210

Crescent's No. P210 Utility Plier is completely new ... revolutionary! It's not a "slip-joint" plier and not to be confused with conventional lap-joint "pump" pliers. Its *double-strong* box joint design is absolutely unique and assures a powerful grip like that of a pipe wrench without sideways twist or strain. It will grip flat, square, hex or round objects with powerful leverage.

QUICK, POSITIVE ADJUSTMENT

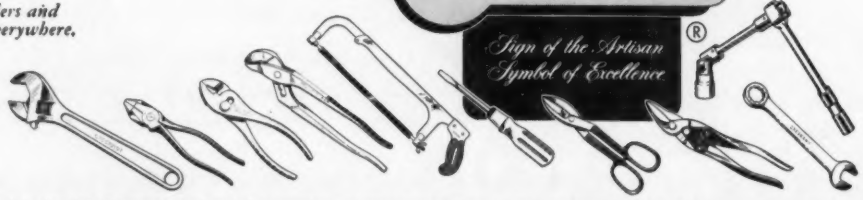
This cut-away view shows joint construction with its extra generous bearing surface at the arrow point. Adjustment is made by simply "walking" the rivet recess over the bearing point with a pumping action of the handles. Easy, positive, capable of heavy loads.



Handsomely finished in rust-resistant zinc plate. Overall length 9½ inches.

Sold by hardware dealers and industrial distributors everywhere.

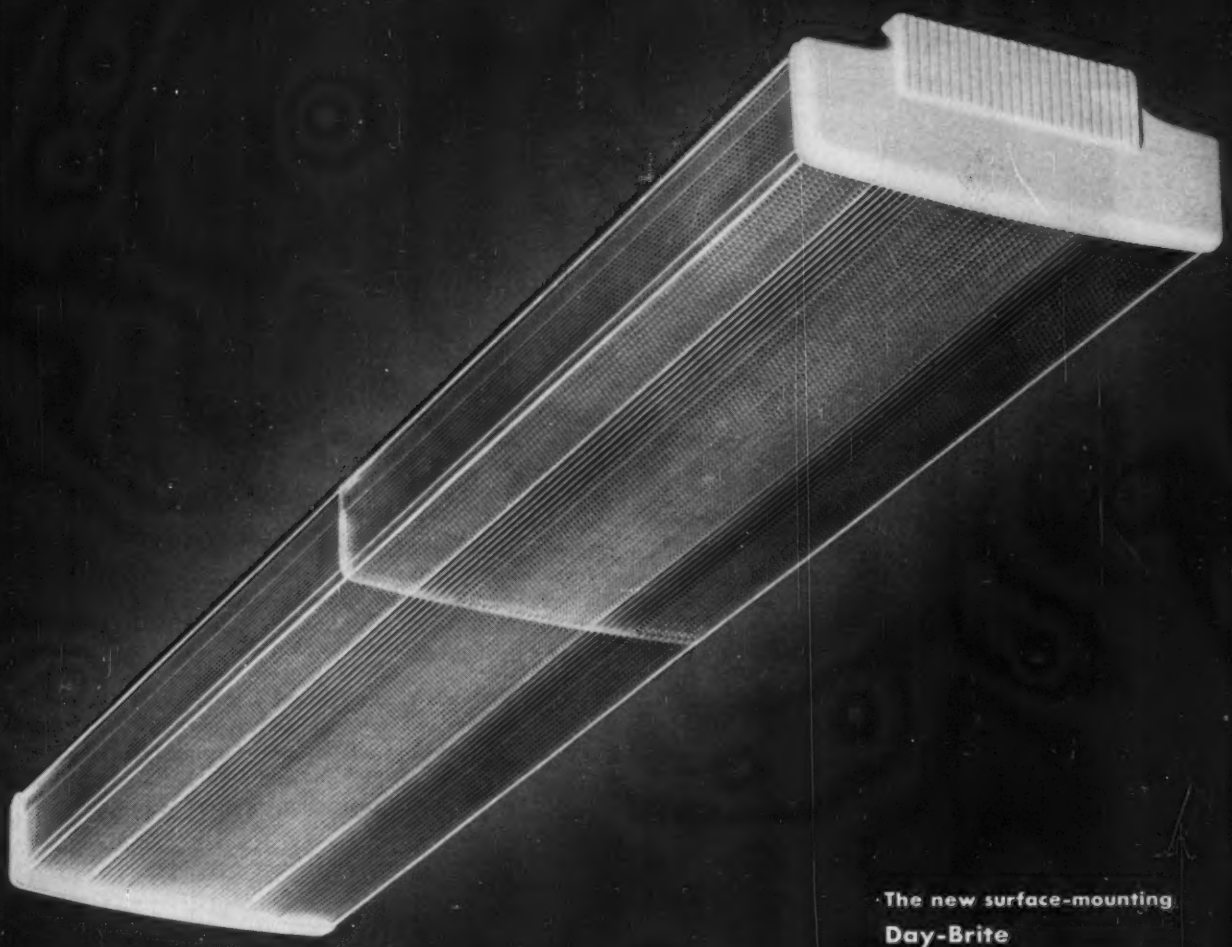
CRESCENT TOOLS
Give Wings to Work
Sign of the Artisan Symbol of Excellence ®



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Lighting by DAY-BRITE makes the *big* difference . . .



The new surface-mounting
Day-Brite
HOLIDAY
with Holophane acrylic
Controlens® enclosure

When design and quality are so apparent, words are superfluous . . . Look and see!

Your Day-Brite representative will gladly help. Literature available. Day-Brite Lighting, Inc., 5417 Bulwer Ave., St. Louis 7, Missouri.

Nation's Largest Manufacturer of Commercial and Industrial Lighting Equipment

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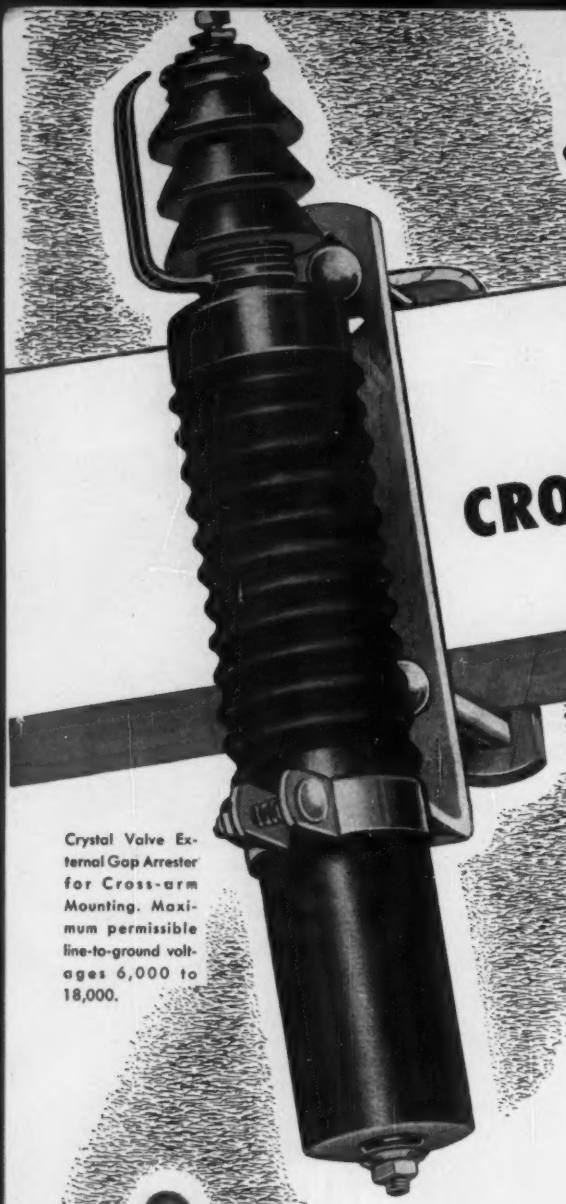
DECIDEDLY BETTER
DAY-BRITE
Lighting Fixtures

YOU HAVE A

1 CROSS-ARM MOUNTING



Crystal Valve External Gap Arrester for Cross-arm Mounting. Maximum permissible line-to-ground voltages 6,000 to 18,000.

Crystal Valve All-Porcelain Enclosed Gap Arrester for Cross-Arm Mounting. Line-stud Ground-stud Terminals. Maximum permissible line-to-ground voltages 3,000 to 18,000.

Your choice of mounting is only one advantage of Crystal Valve Lightning Arresters. Most important advantages to distribution engineers are greatly reduced operating and maintenance costs . . . increased efficiency of the entire distribution system . . . negligible outages during lightning season.

You also have a choice of the type of Crystal Valve Lightning Arrester—with isolating external gap or full enclosed gap; The isolating gap provides positive protection from line lockouts. The fully enclosed gap is weatherproof and has provided positive protection for many years. Both Crystal Valve arresters have:

Exclusive "T" Grain Silicon Carbide Valve Element which is unaffected by moisture or age. It has the highest thermal and surge current capacity of any valve element material.

Ultra-Speed Multiple Arcing assures low impulse sparkover. A series of small spark gaps, instead of a single large gap, electrodes which discharge between smooth, flat surfaces; accurately ground Steatite spacers between gap electrodes . . . these guarantee high speed protection.

Thousands of CV Arresters are giving permanent protection to power lines on cross arms . . . and on transformers under all types of weather conditions. That is why leading utility companies have specified CV Arresters on their lines for more than 35 years . . . why leading transformer manufacturers furnish their product with CV Arresters. They know Crystal Valves give unlimited surge capacity at all ratings and can be installed on all types of circuits without regard to system capacity.

Write today for your copy of "Proved Protection" giving all of the inside facts you should consider in selecting lightning arresters.

CRYSTAL VALVE

LIGHTNING ARRESTERS

2 WAY CHOICE WITH
CRYSTAL VALVE ARRESTERS
2
TRANSFORMER MOUNTING

37½ KVA Allis-Chalmers Protected Type CP-1, Single-phase Transformer with 9 KV Crystal Valve Arrester. Primary voltage, 13,200 GrdY/7620; low voltage, 120/240 volts.
37½ KVA Pennsylvania "Protected Pole Star" Transformer with 9 KV Crystal Valve Arrester. Furnished in sizes 3 KVA through 100 KVA, up to 14,400 volts.
10 KVA Kuhlman CSP Single-phase Transformer with 9 KV Crystal Valve Arrester. Primary voltage, 7200/12,470Y; low voltage, 120/240 volts.
5 KVA Moloney HiperCore Type CSP B-1 Single-phase, 60-cycle Transformer with 3 KV Crystal Valve Arrester.
A-C
37
10
37

Electric Service Manufacturing Co.

PHILADELPHIA 32, PENNSYLVANIA

Represented in Canada by Lyman Tube and Bearings, Ltd., Montreal and Toronto

Utilities can depend on equipment containing C-D-F Insulating Parts

The reliable operation and long life of heavy electrical equipment often depends on insulating parts. A good supplier of insulation draws from past experience to make this possible—C-D-F has been a recognized industry leader since 1895! A good supplier expands his research and technical skill consistently—C-D-F offers the *widest range of electrical insulating materials*, from Vulcanized Fibre to C-D-F Products of Teflon.*

A BIG, RELIABLE SOURCE OF SUPPLY

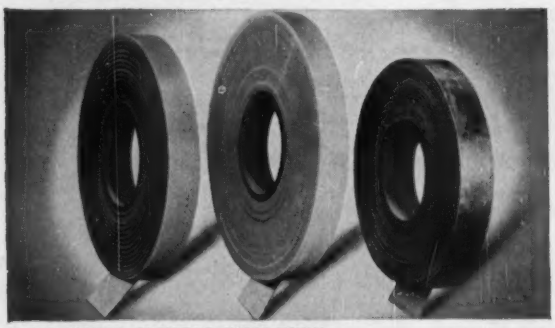
As a buyer of Utility Electrical Equipment, you gain when your manufacturers work with C-D-F. Quality and dependability of electrical insulation, at reasonable cost, are guaranteed. The latest technical advances and ideas can flow freely between you and C-D-F's engineers. This page shows only a few of the many products C-D-F makes and fabricates for the electrical industry. Consult Sweet's Design File for catalog information, or call your C-D-F sales engineer (sales offices in principal cities)—you'll find he's a good man to know!

*Du Pont Trademark

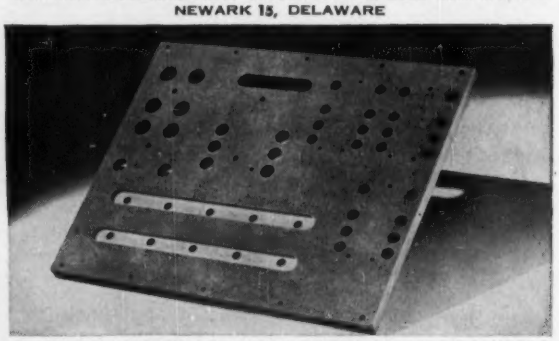
CONTINENTAL DIAMOND FIBRE

CONTINENTAL-DIAMOND FIBRE DIVISION OF THE BUDD COMPANY, INC.
NEWARK 15, DELAWARE

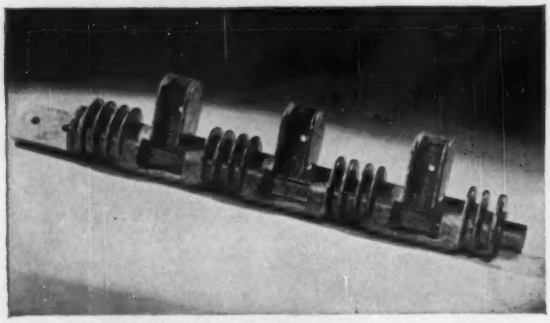
C-D-F HANDLES THE COMPLETE JOB An oil circuit breaker component is made from two Dilecto laminated plastic tubes, with a threaded ring joining the assembly. From raw materials to finish machining C-D-F does it all!



C-D-F MAKES FLEXIBLE INSULATION To meet critical high heat and electrical insulating needs, C-D-F makes these efficient, easy-to-apply tapes. Size range is wide, with latest resins and backing materials used. Write for samples and technical bulletins of Silicone, Teflon, and Micabond tapes.



C-D-F UNDERSTANDS THE ELECTRICAL INDUSTRY'S NEEDS Precisely machined to close tolerances, Dilecto panel boards guarantee dependable insulation, help designers save space. New 1955 Dilecto catalog is yours for the asking, lists all new grades.

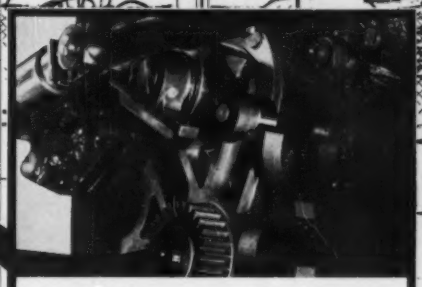


C-D-F MOLDS MANY SPECIALTIES This shaft insulator for a circuit breaker is molded from C-D-F's cloth-based industrial thermosetting plastic, Celoron. Note complexity of mold, clean detailing. Celoron has high impact strength, is used in switchgear.

C-D-F GIVES YOU BETTER MOTOR AND GENERATOR INSULATION All these built-up and bonded mica products are made by C-D-F to provide uniform high-heat resistance and dielectric strength. All forms of Micabond are made for better performance and lower costs.

VOLTAGE REGULATORS

NEW LOAD BONUS FEATURE on all standard self-cooled ±10% 3-phase step regulators rated 750 KVA and below gives up to 130% capacity at ±5% regulation. *Raise* and *Lower* ranges are independently adjustable without de-energizing regulator.



NEW LRT-68 SWITCH on 3-phase step regulators rated 1000 KVA and below offers doubled contact life and quieter operation. New Geneva gear and hydraulic dashpots provide quick, smooth switch action.

NOW: 30% More Current Capacity on General Electric 3-phase Step Regulators

MLT-32 REGULATORS 750 KVA AND BELOW PROVIDE THIS LOAD BONUS

Regulating Range	Current Capacity
% "Raise" or "Lower"	Percentages of Rated Amperes
± 10	100
± 8¾	108
± 7½	115
± 6¼	120
± 5	130

GREATER CURRENT CAPACITY is now available on all standard General Electric self-cooled ±10% MLT-32 three-phase step voltage regulators rated 750 KVA and below.

Simple external adjustment of Load Bonus switch, conveniently located at the position indicator, limits regulating range and increases current capacity up to 130% of rating. Raise and Lower regulating ranges are independently adjustable, and all settings can be made without de-energizing the unit.

DOUBLED LIFE of heavier Arconite contacts in LRT-68 switch used on G-E 3-phase step regulators rated 1000 KVA and below, means greatly reduced maintenance expense.

QUIETER OPERATION—Redesigned Geneva gear lowers friction; gives 20 db reduction in peak switching noise. Mechanism and drive motor completely oil-immersed.

CONTROLLED SWITCHING SPEED—Hydraulic dashpots (similar to shock absorbers) reduce arcing and shock to a minimum; cut maintenance.

For full information on General Electric's complete regulator line, contact your G-E Apparatus Sales Representative, or write Section 423-13, General Electric Company, Schenectady 5, N.Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Generating capacity of this plant is now 250,000 kw. Output goes into transmission system at 115 kv and 230 kv.

Reliability of Allis-Chalmers Switchgear Is a "Must" at Barry Steam Plant

Unit arrangement of auxiliary switchgear places emphasis on reliability in Alabama Power Company's newest base-load plant

Here's the reason. All station auxiliaries for each generating unit are connected to one bus. This scheme places more than ordinary demands on the Allis-Chalmers auxiliary switchgear in maintaining uninterrupted service because it extends the "unit" principle to the station auxiliary switchgear.

Scheme Saves on Breakers

This arrangement is, of course, economical. Only one incoming breaker is used for each unit. An ingenious scheme of putting a single spare exciter on the tie circuit between two units reduces breaker requirements.

Barry Steam Plant has initial installed capacity of 250,000 kw, with provision for ultimate expansion to 1,000,000 kw.

Starting power for station service auxiliaries is provided by a station service transformer taking power from the 115-kv transmission system. This starting transformer also serves as a backup for the two regular unit station service transformers.

These two transformers are connected to their respective generator buses. They provide power to auxiliaries at 4.16 kv through two lineups of Allis-Chalmers switchgear — each with 22 cubicles.

For Progress in Switchgear

ALLIS-

Transfer Simplified

A manual make-before-break scheme is used to transfer station service load between starting and unit transformers. There is no synchronizing problem, since both starting transformer and generator are connected to same 115-kv bus.

Interlocks are provided to trip out the connected supply breaker when closing the other incoming supply breaker.

Customary interlocks are provided in the switchgear to insure proper sequence of start-up and shut-down of boiler auxiliary motors.

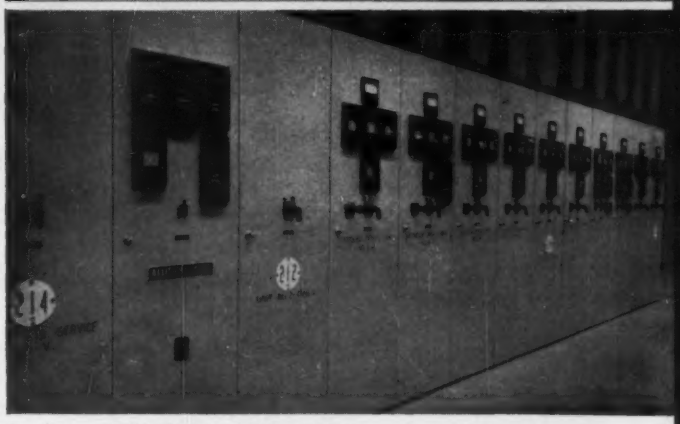
Both overload and short-circuit protection are provided to the switchgear for all feeder circuits.

Power is fed to the switchgear near a midpoint in the bus. Essential auxiliaries are duplicated on each side of the supply point.

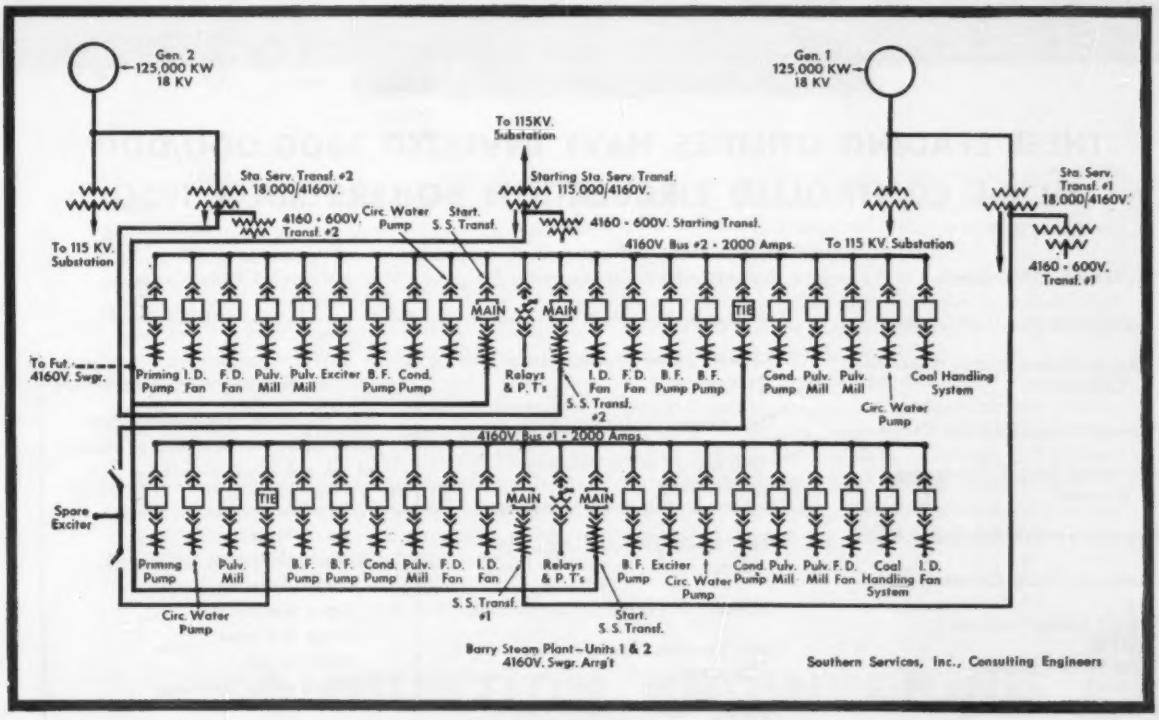
This means sufficient auxiliaries can be connected to carry about half load in an emergency. And it provides more uniform current distribution in the switchgear.

* * *

Allis-Chalmers engineers worked in close cooperation with engineers from Southern Services, Inc. and Alabama Power Company. This is but one of the many auxiliary switchgear installations built by Allis-Chalmers. For more information, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.



Two lineups of Allis-Chalmers 4.16-kv switchgear are used; each lineup has 22 cubicles.



CHALMERS

A-C ALLIS-CHALMERS

A-4959

$300,000,000

THESE LEADING UTILITIES HAVE INVESTED $300,000,000 IN C-E CONTROLLED CIRCULATION BOILERS SINCE 1950

*Boston Edison Company

Carolina Power & Light Company

Chicago District Electric Generating Corporation

*Cincinnati Gas & Electric Company

*Cleveland Electric Illuminating Company

*Commonwealth Edison Company

*Consumers Power Company

*Detroit Edison Company

*Duke Power Company

*Illinois Power Company

*Kansas City Power & Light Company

Kansas Power & Light Company

*Niagara Mohawk Power Corporation

*Northern Indiana Public Service Company

Pennsylvania Electric Company

*Philadelphia Electric Company

*Potomac Electric Power Company

*Public Service Electric and Gas Company

*Rochester Gas & Electric Corporation

*South Carolina Electric & Gas Company

*Southern California Edison Company

*Tennessee Valley Authority

*Virginia Electric & Power Company

*Wisconsin Electric Power Company

The following engineering firms were associated with one or more of the above installations:—

Bechtel Corporation
Black & Veatch
Commonwealth Associates, Inc.
Ebasco Services, Inc.
Gilbert Associates, Inc.
Jackson & Moreland
Sargent & Lundy
Stone & Webster Engineering Corporation
United Engineers & Constructors, Inc.

*More than one unit.

SUCCESS STORY

...and they were there!

In December 1941, this group of engineers watched the "kick-off" to the most remarkable success story in power boiler history. They were visiting the Somerset Station of the Montaup Electric Company, Somerset, Mass., to inspect a new boiler . . . a controlled circulation boiler.

Nearly 10 years elapsed before utility companies – restricted during the War and confronted, postwar, with a vast pent-up demand for power – were in a position to consider basically different equipment. Then, in July, 1950, Virginia Electric & Power Company, in collaboration with their consultants, Stone & Webster Engineering Corporation, ordered a C-E Controlled Circulation Boiler. The swing was on! Leading utilities from coast to coast ordered and reordered Controlled Circulation Boilers to a present total investment of about $300,000,000. The equivalent turbine capacity of these boilers is more than 12,000,000 kw, or over 13 percent of the total fuel-generated capacity of the whole utility industry.

Such large-scale acceptance of a new design of boiler in so short a period of time is unique. As a matter of fact there is nothing in the annals of the power history that even approaches it.

The development of the Controlled Circulation Boiler is another example of Combustion's design leadership in the field of steam generation . . . leadership that makes it worth your while to consider C-E Boilers for *your* steam requirements whether large or small . . . utility or industrial . . . power, heating or process. There's a type and size of C-E Boiler that's just *right* for your needs.

COMBUSTION ENGINEERING

C-E

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

B-937

STEAM GENERATING UNITS; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; HOME HEATING AND COOLING UNITS; DOMESTIC WATER HEATERS; SOIL PIPE

To help you with

the problem of

A. R. Lee, General Electric application engineer, discusses the many conditions affecting the selection of station control cables—and the wide variety of cable types available to handle the job. Recent General Electric cable developments, and men like Lee who work closely with electric utility engineers, are helping to simplify the complex problem of selecting the right control cables for these many conditions.

control cable selection

General Electric introduces a new cable

A number of application problems often face the electric utility engineer who must select the best control cable for a particular installation. Must he consider the electrostatic effects of adjacent power cables? Is it necessary for the cable to be flame-resistant? Will there be a problem of moisture, of high ambients, or of extreme cold?

In any event, there will be a combination of conditions which should be considered in the selection of the cable most suitable for the application.

Polyethylene Flamenol* Control Cable
A new answer for most applications

Out of General Electric's experience in manufacturing *and using* control cables has come the development of another new type of control cable...a cable that will simplify many application problems. It is the new G-E polyethylene Flamenol* control cable. This cable can be used indoors or outdoors, in wet or dry locations, for aerial or direct burial installations. It combines the best properties of both polyethylene and polyvinyl chloride: the polyethylene insulation provides high dielectric strength, low moisture absorption, and low specific inductive capacity; the polyvinyl chloride jackets, both on the single conductors and over core, resist flame, moisture, oil, acid, alkali, sunlight, weather, and abrasion. The cable is rated 75 C copper temperature, 600 volts.

Extreme conditions may call for other cables

There is always the possibility of the extreme and unusual situation. In these cases the full line of General Electric control cables—and the G-E engineers who know them best—can be of particular help to you. These men, through their broad experience in working with electric utility engineers, have become familiar with (and have helped with the solution of) most of the application problems you will face.

For example, if your problem is moisture plus very high ambients, their answer will probably be a silicone-rubber insulated cable with asbestos braid. If you must have flexibility under conditions of extreme cold, Super Coronol* Geoprene* cable provides it. Even if you require resistance to atomic radiations, G-E Wire and Cable engineers can offer a special combination of insulating materials and jackets to do the job.

Whatever your control cable problem, General Electric can help you find the best answer. See your local G-E Wire and Cable specialist, or write Section W181-727, Construction Materials Division, General Electric Company, Bridgeport, 2 Conn.

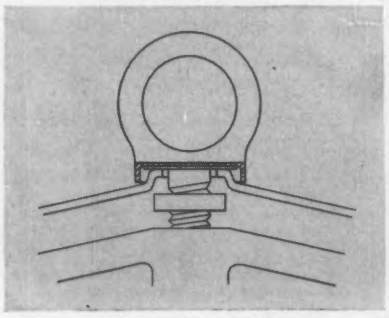
*Registered Trade-mark General Electric Company

Progress Is Our Most Important Product

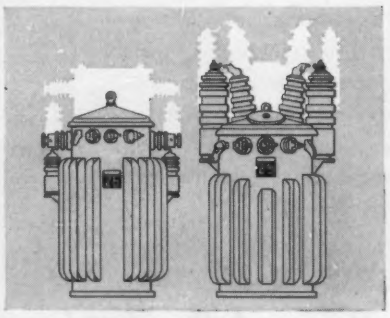
GENERAL ELECTRIC

New Offset Breaker Handle . . . on new 1956 CSP transformers identifies new breaker trip settings increasing overload capacity 20%, emergency range 15%.

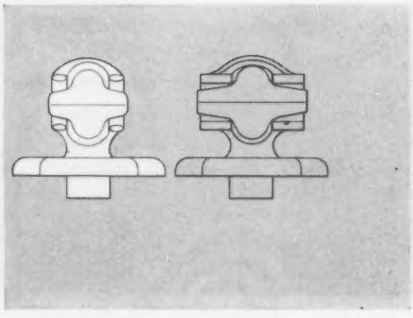
Simpler Overload Monitoring . . . new optional thermal-duty indicator records total overload hours for life of transformer; light and dial easily read from the ground.



Convenient Lifting Eyebolt (3-50 kva) . . . eliminates slings, chains, cable in mounting transformers; saves time. Each transformer gets production line pull-test at twice its own weight.



Exclusive—Reduced Height of All Transformers (15-167 kva) . . . you can replace present equipment with the next larger kva size on the same pole without change in hardware.



New LV Terminals for Aluminum or Copper Conductors . . . larger low-voltage terminal with captive bolt increases contact area, lowers contact resistance.

BUY A "BUSIER" TRANSFORMER...

Eight built-in timesavers give Westinghouse transformers capability to do more

Rating for rating, the Westinghouse transformer works longer while overloaded, giving you time—extra time—to do something about it.

In all new CSP® transformers, operating range has been increased 20%. This has been done without sacrifice of service life of the equipment. There's still more . . . higher breaker trip settings add 15% emergency capacity.

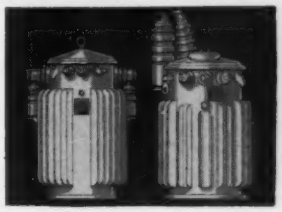
What do you get out of all this? Busier Westinghouse transformers give you more of a breather to make orderly change-outs in growth areas, or to handle unexpected peaks. Or to cope with emergencies in widely scattered places.

Easy and effective load monitoring on the conventional Westinghouse transformer is made possible with the optional new thermal-duty indicator. The indicator keeps tab on overload in two most effective and convenient ways. First, the red light goes on at the overload point. Second, the dial records total overload hours cumulatively. The story that the indicator tells comes straight from coil copper, the only true transformer-temperature indicator.

And what about installation? Below are shown a few of many other new features that simplify the job . . . right up to the time the lineman takes off his gloves.

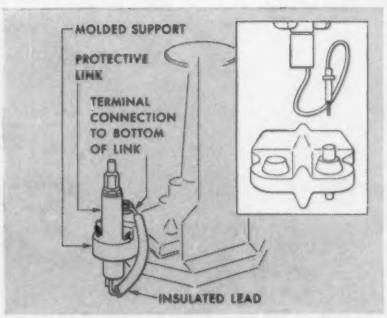
These are the things a really modern transformer can do for you. Call your Westinghouse sales engineer today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70769

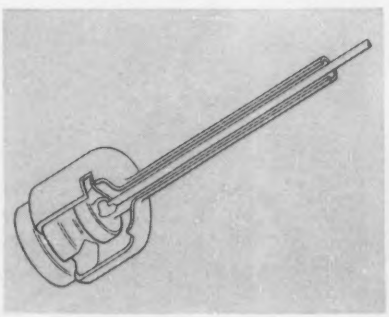


WATCH WESTINGHOUSE!

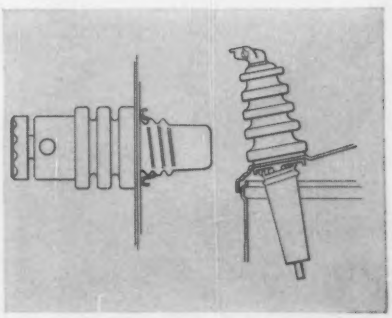
*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*



Faster Change-out of Protective Link on All CSP Transformers—Wall or Cover Mounted . . . former major repair operation now simple, routine maintenance.

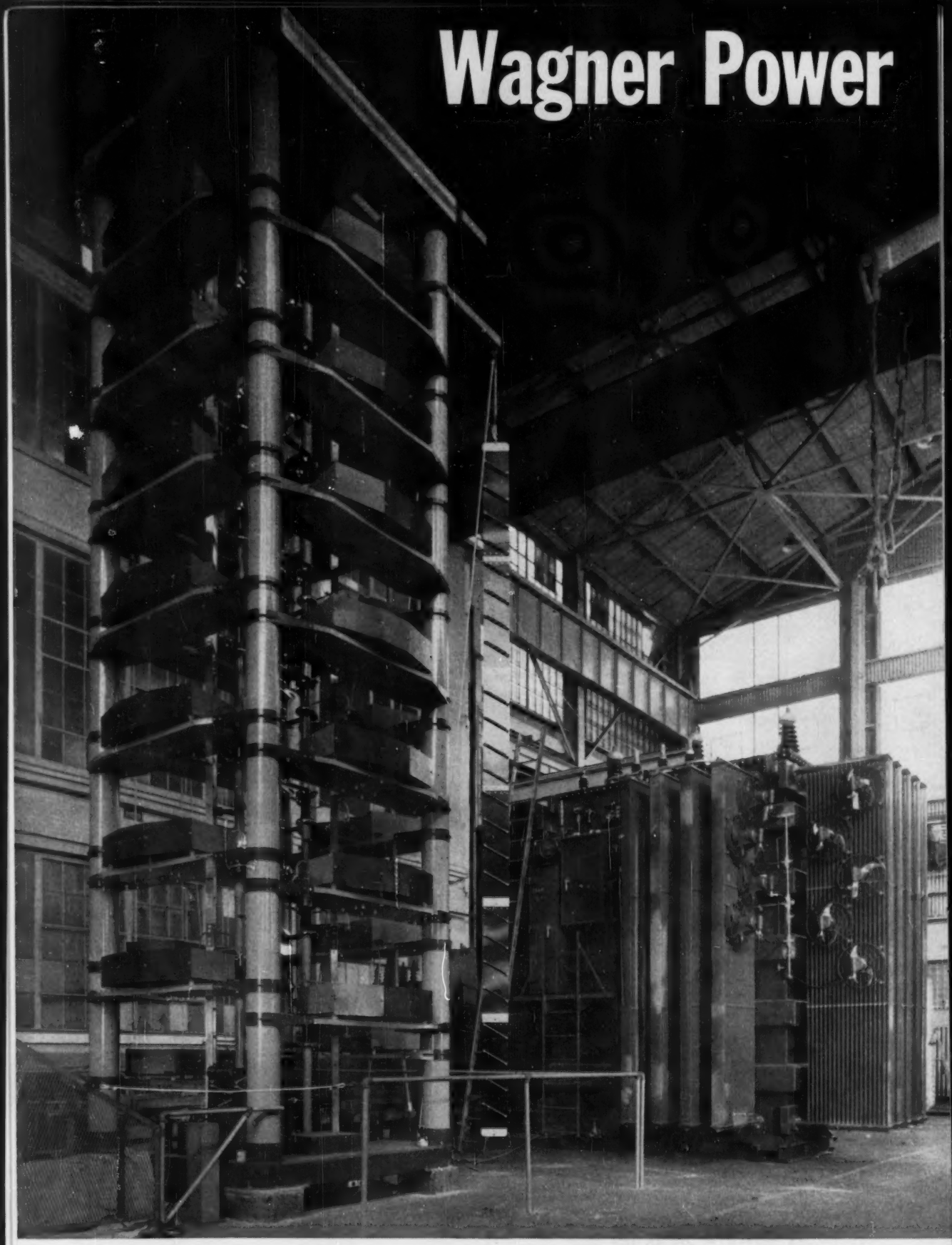


Prevent Line Lockouts due to short circuiting by birds and squirrels; new, optional plastic bird guard; snaps easily over cover mounted high-voltage bushing.



Better Bushing Seal, Simpler Maintenance . . . internally mounted, threaded high- and low-voltage bushings with spring grip nut.

Wagner Power



Impulse test being given to a new power transformer in the Wagner transformer plant. The 3 phase, 60 cycle transformer under test is rated 20,000/25,000/33,333 Kva forced air cooled.

Transformers

Designed—insulated—and tested to handle heavy voltage surges for assured power continuity

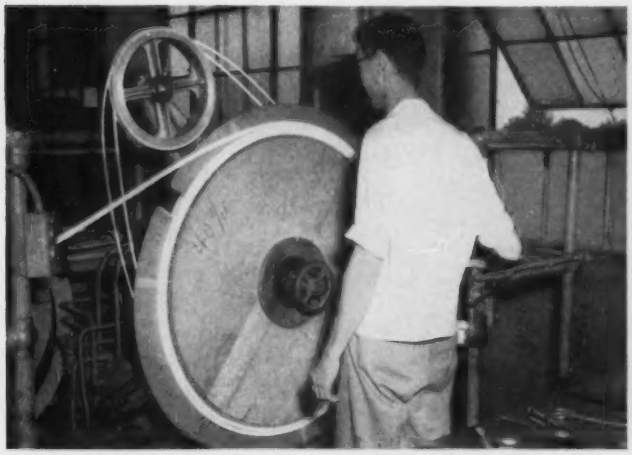
Wagner has been building power transformers for sixty-five years. The knowledge gained and the facilities acquired in all those years make the designing and building of fine power transformers part of the day's work at Wagner.

Wagner power transformers are designed and insulated to withstand practically any lightning or switching surge that might be encountered on a properly protected transmission line.

But, because heavy surges are the greatest enemy of transformer life, Wagner subjects every new design to rigid tests to make doubly sure that these transformers will provide the utmost reliability and service continuity.

Consult Wagner on your next power transformer installation. Thirty-two branches are at your service. Bulletins TU-180 and TU-181 give information on the complete line of dependable Wagner Transformers.

Buffer coils are used at the ends of the high voltage windings for Wagner power transformers. They protect against surges by absorbing the first impact of any line disturbance.



The two coils forming one double disk section of a high voltage buffer coil are wound at one time on the same machine.

The buffer coils have extra cable paper insulation on the conductor. Each section is individually wrapped with insulating tape.

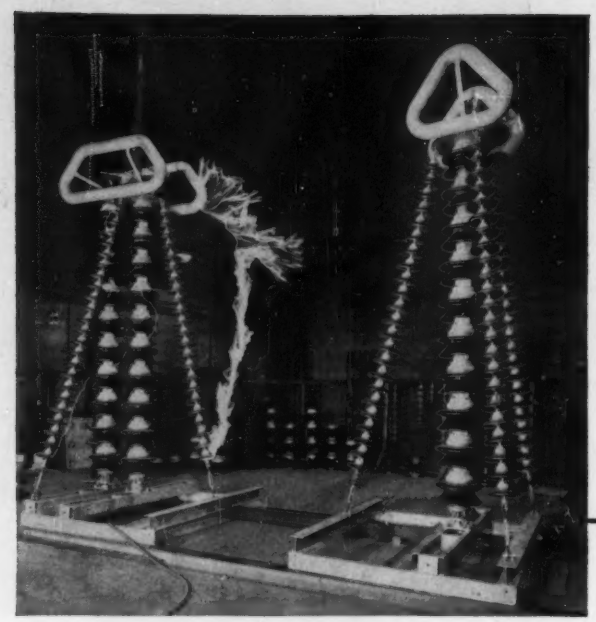
WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

BRANCHES IN 32 PRINCIPAL CITIES

Wagner Electric Corporation
EST. 1891

T56-11

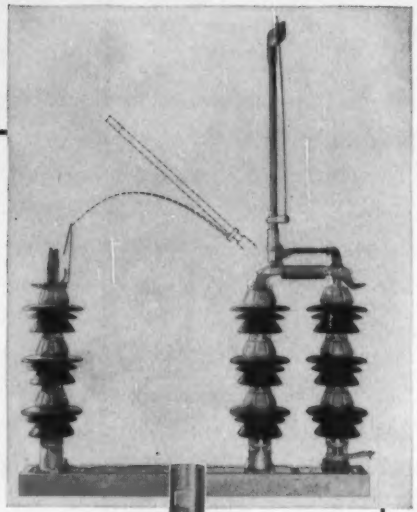
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

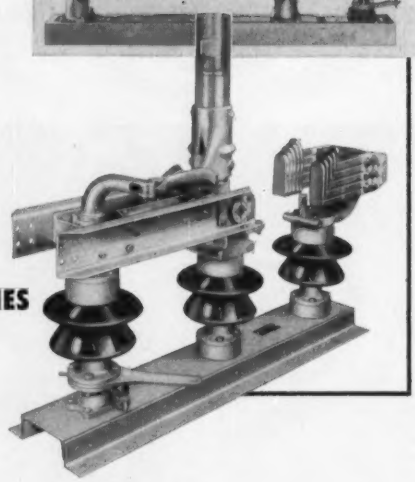


R&IE

SWITCH DEVELOPMENT AND RESEARCH

LOOKS HIGHER AND HIGHER SOLVING THE PROBLEMS OF TOMORROW





• HIGHER VOLTAGES

Over the High Voltage Horizon are the new operating characteristics of tomorrow's switch. Many factors associated with 400 Kv., or 500 Kv., such as insulation, break distance, corona shielding, R. I. V., all weather operation, and general refinement are constantly being investigated.

• HIGHER INTERRUPTING CAPACITIES

An increasing variety of air switch attachments are continually being perfected to increase the usefulness of air switches. The "Arc Restrictor" shown is one of several types for interrupting line charging current. Others for interrupting full-load current, isolating capacitor banks or for switching parallel loads, are available.

• HIGHER CURRENTS AND MOMENTARIES

Increased short circuits and higher fault currents are more important than ever before. The new straight-line current path design of Hi-Pressure Contact Jaws and Sealed Pressure Hinge Contacts is the answer to these problems.

R&IE Research and Development constantly evaluates the many possible design problem solutions to improve switching performance on the nation's expanding power lines. The new and larger R&IE laboratory facilities will give you a better guarantee of good performance and improved quality switching equipment.

•

R&IE EQUIPMENT DIVISION

I-T-E Circuit Breaker Co.

GREENSBURG, PENNA.

NUCLEAR NEWS FROM ATOMICS INTERNATIONAL

Industry's First Private Research Reactor Now in Operation

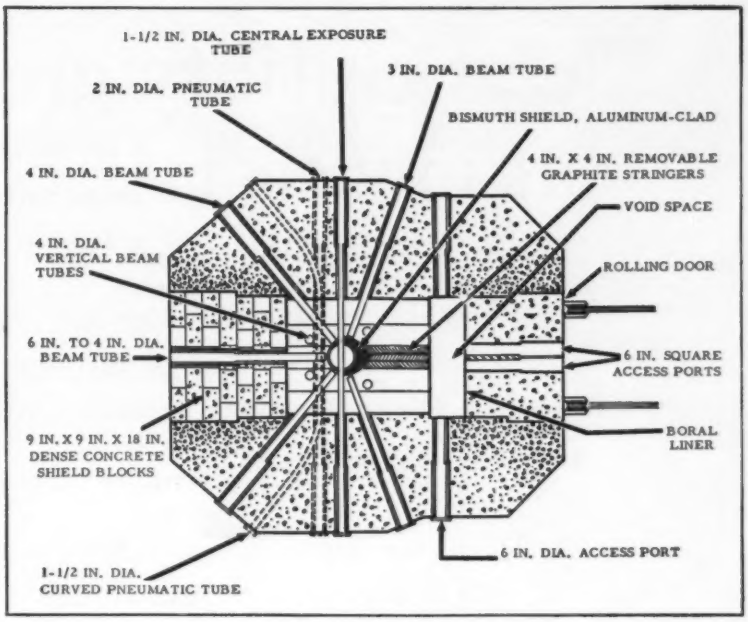
The Armour Research Foundation's nuclear reactor, located on the Illinois Institute of Technology Campus on State Street near Chicago's Loop, began operating early this spring. This marked the first time that private industry has had at its disposal a nuclear reactor expressly designed for industrial research.

Already under way at Armour are programs by participating companies, taking advantage of the revolutionary research techniques made possible by the new facility. The schedule includes allocation of reactor "time" for private studies, free of security restrictions. Areas of study include: food and drug processing; materials research – glass, ceramics, plastics, rubber, textiles, etc; petroleum, chemicals and other industrial materials and processes.

The Model L8 Armour reactor is of the homogeneous solution type, designed to operate at 50 KW and to produce a maximum thermal neutron flux of about 1.7×10^{12} neutrons/cm^2-sec at the center of the reactor core. Exposure facilities are provided through which the neutron flux is available in varying intensities for experimental purposes. Power level is controlled either manually or automatically by a vertical control-rod system. The reactor is safeguarded by a unique control system which "scrams," or automatically shuts down the reactor, if necessary.

One of several reactors produced by ATOMICS INTERNATIONAL, a Division of North American Aviation, Inc., the design and construction of the L8 Model is based on the company's 10 years' experience in the development of peaceful applications of nuclear energy. Other applications include a reactor designed for a prominent southern California university, specially adapted for cancer and other medical research; the important Sodium Reactor Experiment in the Santa Susana Mountains near Los Angeles, part of the AEC program to develop economical power from nuclear energy; plus development and design of a 75,000 KW sodium-graphite nuclear power plant.

ATOMICS INTERNATIONAL is a major reactor builder—experienced in the design, construction and operation of nuclear reactors for research and the production of power.


1-1/2 IN. DIA. CENTRAL EXPOSURE TUBE
3 IN. DIA. BEAM TUBE
2 IN. DIA. PNEUMATIC TUBE
BISMUTH SHIELD, ALUMINUM-CLAD
4 IN. X 4 IN. REMOVABLE GRAPHITE STRINGERS
4 IN. DIA. BEAM TUBE
VOID SPACE
4 IN. DIA. VERTICAL BEAM TUBES
ROLLING DOOR
6 IN. TO 4 IN. DIA. BEAM TUBE
6 IN. SQUARE ACCESS PORTS
9 IN. X 9 IN. X 18 IN. DENSE CONCRETE SHIELD BLOCKS
BORAL LINER
6 IN. DIA. ACCESS PORT
1-1/2 IN. DIA. CURVED PNEUMATIC TUBE

Reactor Plan View

ARMOUR RESEARCH REACTOR MODEL L8

Characteristics

Design Power	50 kw
Zero Power Critical Mass*	850 gm U^{235}
Maximum Thermal Neutron Flux	1.7×10^{12} n/cm^2-sec
Mass Coefficient of Reactivity*	0.03%/gm
Temperature Coefficient of Reactivity*	–0.029%/°C
Fuel Solution Temperature at 50 kw*	80° C
Excess Reactivity at 20° C, Zero Power*	3%
Reactivity Held in Control and Safety Rods*	8% (2% each rod)
H : U^{235} Atomic Ratio*	350
U^{235} Concentration*	75gm/liter
Power Density, Maximum	5.5 watt/cm^3
Power Density, Average	3.85 watt/cm^3

Approximate Value

Brief General Description—The reactor fuel is a light water solution of UO_2SO_4, enriched in U^{235}. This fuel is contained in a spherical stainless steel core tank, which is surrounded by a graphite reflector. The reactor is shielded with high density concrete (density 3.5 gm/cm^3) plus other selected materials. Fuel-handling, gas-handling and cooling systems are provided; also complete instrumentation and equipment are installed for remote operation and to provide automatic safety action.

Experimental Facilities—The experimental facilities include nine assorted beam tubes, 3" to 6" ID; straight and curved pneumatic tubes, 1½" and 2" ID; central exposure tube; horizontal thermal column 5' square, with four 6" access ports. In addition there are special exposure facilities which make use of the gamma activities in the reactor atmosphere.

If you are interested in any phase of our activities, ATOMICS INTERNATIONAL is staffed and equipped to help you. Please write: Applications Engineering Service, Dept. EW-N3, ATOMICS INTERNATIONAL, P. O. Box 309, Canoga Park, California. Cable address: ATOMICS.

ATOMICS INTERNATIONAL
A DIVISION OF NORTH AMERICAN AVIATION, INC.
PIONEERS IN THE CREATIVE USE OF THE ATOM

Electric utility growth at low cost is demonstrated

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Two 1,000-kw. Electro-Mobile rail units . . . operating either on natural gas or Diesel oil, as circumstances require . . . give them these advantages in extended transmission service:

They boost substation supply through high demand periods.

They take over full local power needs in event of transmission line trouble.

The units, time-clock operated, can be used singly, or in parallel.

A unique maintenance program assures them against obsolescence even in the far future.

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Sold and serviced directly through a manufacturer's organization. Electro-Motive Division offices located in: New York City, Chicago, Jacksonville, St. Louis and San Francisco. In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario.

Rail car, truck trailer and portable units— 350 to 1,000 kw.

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How Ebasco helps
the electric power industry

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ARE YOU now realizing the greatest sales potential from your market area?

ARE YOU developing the demand for additional electric service through proven promotion methods?

ARE YOU using sales techniques that help keep the load evenly distributed throughout the year?

ARE YOU employing a program that will maintain favorable public opinion?

The answers to these questions are vital to the future growth and prosperity of your company. And Ebasco, with long experience in all phases of utility operation, is able to supply them. Ebasco specialists will study markets and trends, will offer tested advertising and promotion ideas, will help with your sales organization structure, public relations program and sales training.

Backed by nearly 50 years of association with utilities of all sizes, Ebasco can provide a skilled, objective viewpoint to supplement the activities of your own personnel.

To find out what Ebasco sales and public relations service can do for your company to keep sales at high levels write for our booklet—"The Inside Story of Outside Help". Address Ebasco Services Incorporated, Dept. M., Two Rector Street, New York 6, N. Y.

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-it had to be different!

. . . to successfully eliminate the minute arcing and discharges that cause annoying radio and television interference–and to do it by a method divorced from ineffectual standard practices–**it had to be different!**

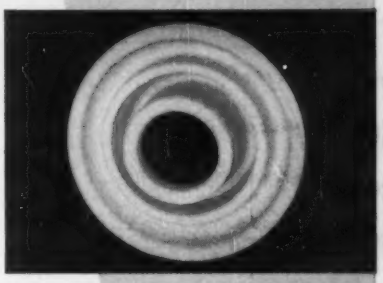
Illustrated steps as shown at the right depict the stages of application of **"TYPE N"** glaze. **NO OVERLAY, NO UNDERCOAT**—but a permanent, hard, smooth, vitreous, conductivity controlled glaze.

RESULT—a noise proof insulator without equal.

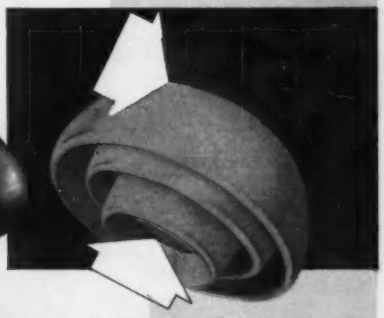
Specify Porcelain Products **"TYPE N"** glaze.

3 GLAZING STEPS

1. Direct application of "TYPE N" to bare porcelain head.



2. Direct application of "TYPE N" to bare porcelain pinhole.



3. Application of Regular Brown glaze on balance of pintype to match points as shown by arrows.

EEI-NEMA CLASS 55-4
PP #6198N

PP INC.

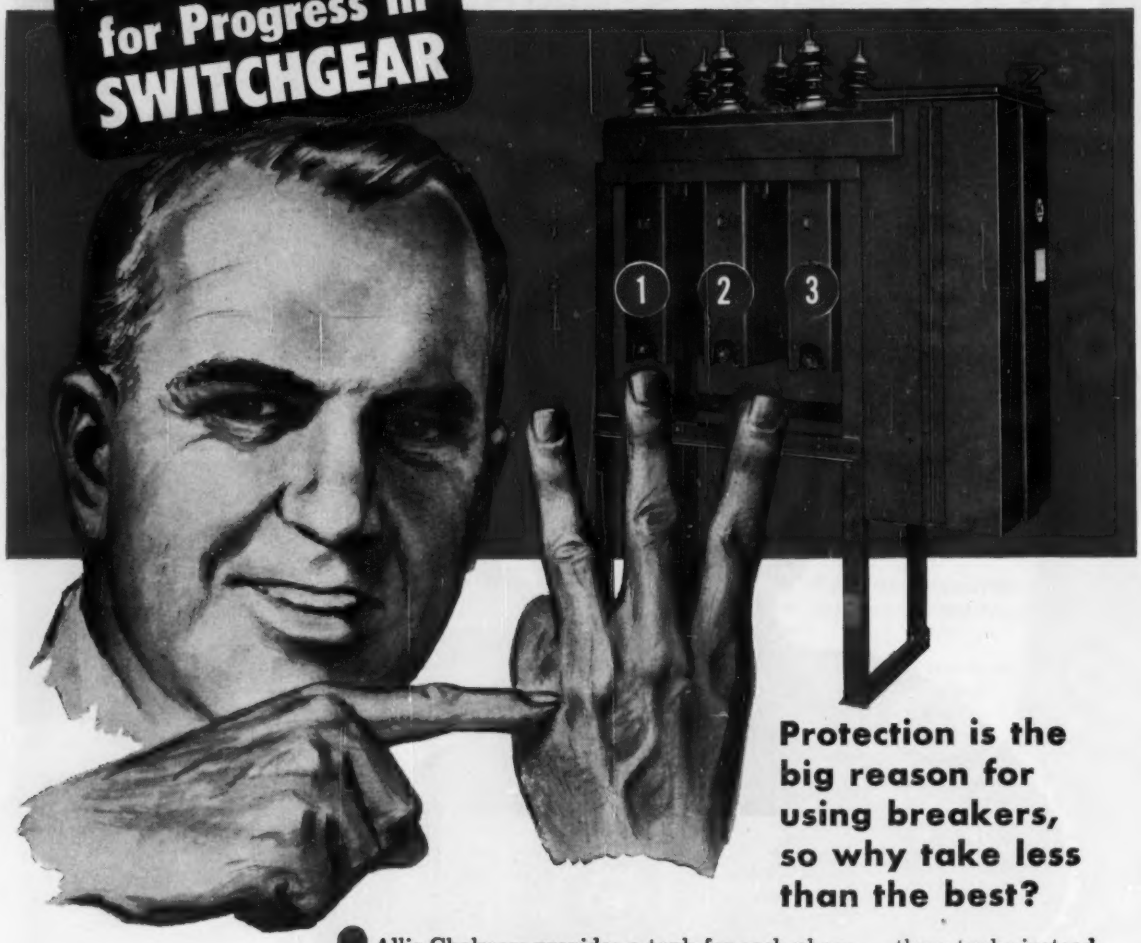
Porcelain Products, Inc. / **Parkersburg, West Virginia.**

For system safety

3 TANKS

are needed in outdoor Distribution Breakers

ALLIS-CHALMERS for Progress in SWITCHGEAR



Protection is the big reason for using breakers, so why take less than the best?

Allis-Chalmers provides a tank for each phase . . . three tanks instead of one . . . to eliminate the danger of internal phase-to-phase flashover usually caused by line-to-ground fault. Maintenance is reduced, since only the faulted phase is affected. Three-tank breakers provide greater system safety than single-tank units, yet cost *you* no more.

Tank-per-phase construction and mechanically trip-free operation are but two of many quality features in Allis-Chalmers 14.4 and 23-kv outdoor distribution breakers.

Get Complete Data — Ask your nearby Allis-Chalmers office for complete information, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for Bulletin 71B7946. A-4894

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

ANOTHER REASON WHY UTILITIES EXPECT MORE FROM

POWERS *American*

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HYDRAULIC DERRICKS

3 MODELS... 7 SIZES

You just can't beat the cost-cutting convenience of Pole-Master. At the flick of a lever, powerful hydraulic cylinders move the derrick to the position that's *exactly* right for the hoisting job. There's no exposed mechanism. Head sheave can be threaded from the ground.

When it comes to capacity, Pole-Master equals or surpasses conventional derricks of comparable rating. It stows *above* the body... never obstructs valuable cargo area space.

Aren't these the features you've long wanted in a derrick for your job?

The powerful Series PM-2 Pole-Master, shown above on a Powers-American Series 800-C Line Body, is available in sizes for handling 40′, 55′, and 70′ poles.

DESCRIPTIVE LITERATURE ...plus complete price information IS YOURS FOR THE ASKING!

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AUTO BODY COMPANY

5900 NO. BROADWAY • ST. LOUIS 15, MO.

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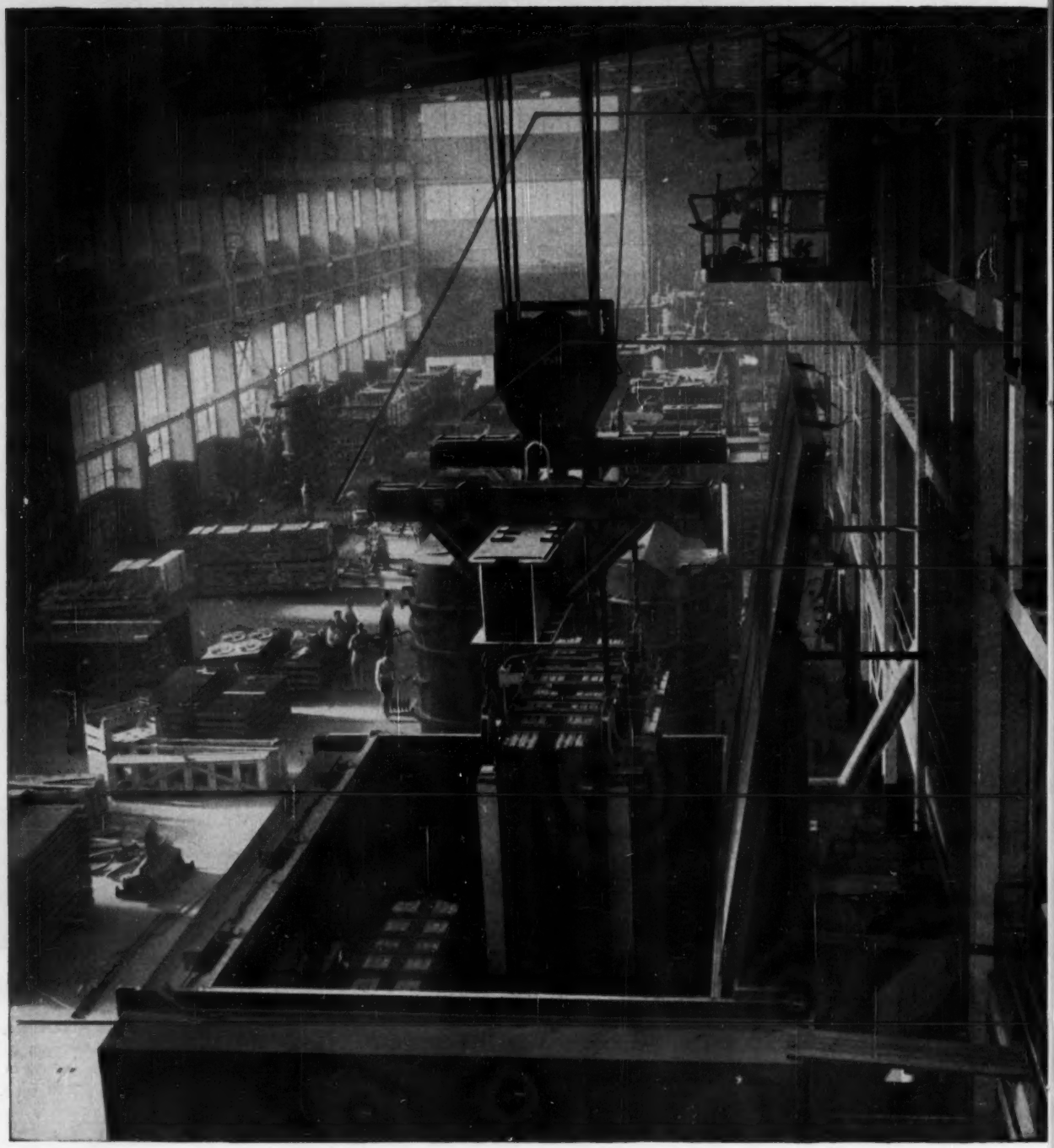
Series HD-2 Pole-Master Derricks can be furnished in sizes for handling 40′ and 55′ poles.

The Series HD-4 Pole-Master, actuated by four hydraulic cylinders, handles 55′ and 70′ poles.

Powers-American conventional derricks, tripod or T-type, are available in all sizes and capacities.



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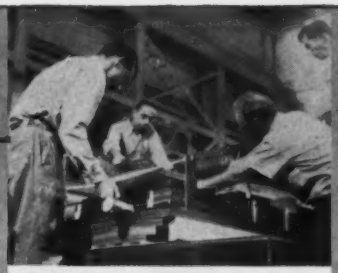

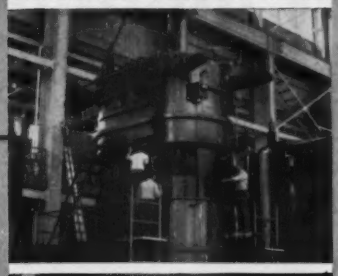

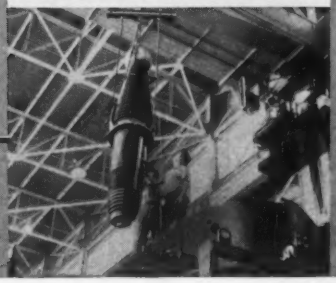

SPEAKING OF HIGH Kva . . .

Within Moloney's large power transformer bay, men and machines are building dependable power transformers in higher Kva and voltage ratings. Moloney can supply transformers for your utility system requirements . . . regardless of size and voltage rating.

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Get Dependability at its Best

MEPF-44

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To better describe our service to the electric power industry, the LOCKE Department of General Electric has changed its name to—

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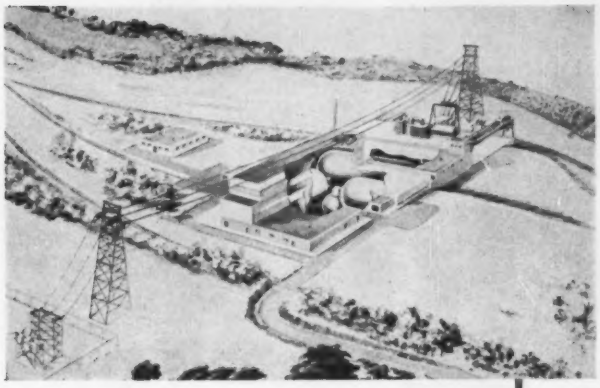
In its sixty-four-year-old tradition as pioneer in the insulator field, the Insulator Department will continue to originate important insulator developments.

The trademark, LOCKE, will still be used in connection with General Electric insulator catalog numbers.

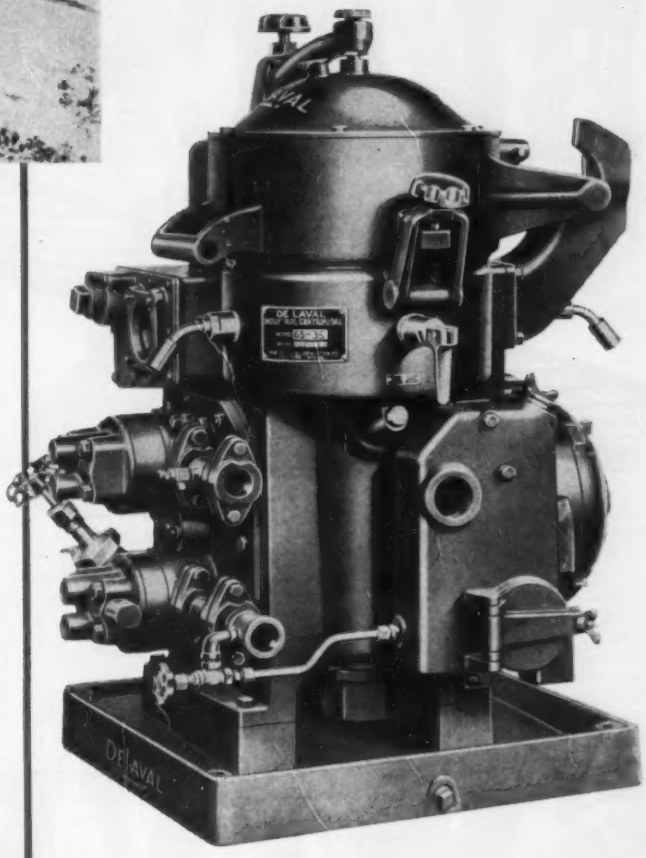
Progress Is Our Most Important Product

GENERAL ELECTRIC

WHAT'S DE LAVAL GOT TO DO WITH NUCLEAR FISSION?...



PLENTY!



Right now De Laval is making an important contribution to the efficiency of America's first commercially-built, full-scale atomic power plant for the generation of electricity.

Under construction by the Duquesne Light Company at Shippingport, Pa. . . . this revolutionary power plant will be equipped with a De Laval "Uni-Matic"® Turbine Oil Purifier—providing completely dependable protection for turbine lubricating oil.

For forty years, De Laval Industrial Purifiers have set the highest standards for efficiency and dependability . . . have provided vital protection in plants from coast to coast.

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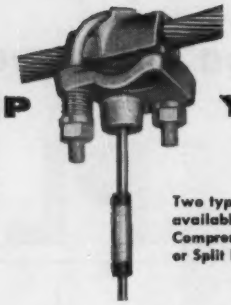
A U-BOLT CLAMP YOU CAN WORK HOT!



Two types of taps available: with Compression Fitting or Split Bolt

BLACKBURN

Here's a hot line clamp for large aluminum mains with all the advantages of a U-bolt connection. Reduces costly service calls and burn-downs. Costs more than conventional hot line clamps—*and worth it!*

Castings and hardware of aluminum alloy. Standard tap of tin plated bronze—compression tap of aluminum.

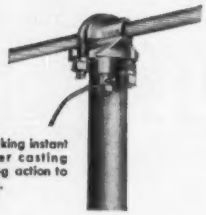
Main—1/0 to 336.4 ACSR
Standard taps—6 AWG to 2/0 AWG
Compression taps—6 to 1/0 ACSR

Patent Applied For

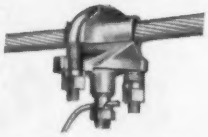
SWIVELOK

Hang over conductor with shotgun stick...

Slam it home and let up on stick.



Up it pops, making instant contact. Lower casting provides wiping action to prevent arcing.



Tighten nuts with socket wrench in stick and you have a trouble-free connection.

Send for your FREE SAMPLE Today!

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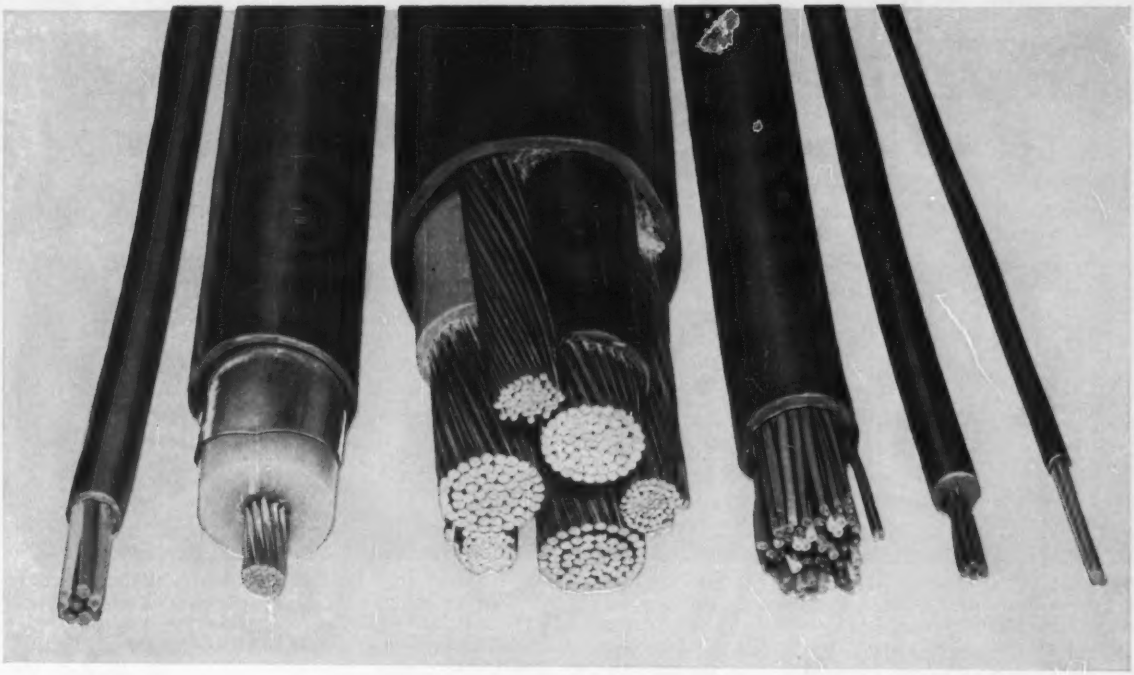

There is an ALATHON® polyethylene resin for your specific insulating and jacketing need

ALATHON polyethylene resins are outstanding in the field of electrical insulating and jacketing materials. Not only are the inherent properties of ALATHON suited for wire and cable insulation, but a number of compositions have been developed for specific applications. Performance in these specific uses has been improved by basic changes in the molecular structure and by advances in compounding with improved stabilizers and other ingredients.

ALATHON polyethylene resins offer low power loss and dielectric constant, toughness and flexibility even at extremely low temperatures, and high moisture resistance. ALATHON has particularly outstanding thermal and mechanical properties.

ALATHON 4, BK-20 (black) offers exceptional outdoor durability and resistance to environmental stress cracking. It is protected from ultraviolet light by fine channel black, intimately dispersed, and has excellent low-temperature toughness, contributed by the high molecular weight of the composition.

ALATHON 5, NC-10 (natural) and ALATHON 5B, NC-10 (colorless) are unpigmented and offer the best electrical properties. The low power factor and dielectric constant of these resins remain essentially unchanged over the entire range of frequencies measured to date, and over a wide range of temperatures.

ALATHON 5, BN-07 (brown) is specially compounded to give a measure of weather resistance without sacrificing low dielectric loss characteristics.

ALATHON 5, BK-21 (black) is protected from ultraviolet light by fine channel black. It has good loss characteristics for material containing carbon.

ALATHON 5, BK-22 (black) is similar to ALATHON 5, BK-21, but contains more carbon black for greater weather resistance.

ALATHON 6, NC-10 is a foamable polyethylene composition that forms a cellular wire coating with fine, discrete pores. Because of the presence of the inert gas, the dielectric constant is even lower than that of solid polyethylene.

RULAN is based on polyethylene resin compounded to give flame-retardant qualities with good electrical properties. RULAN passes the Underwriter Laboratories vertical flame test.

Du Pont has prepared property and application data that will help you choose the composition of ALATHON which will work best in your specific application. To get this complete information, simply clip and mail coupon.

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specify ALATHON® polyethylene resin

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Please send me complete information on Du Pont ALATHON polyethylene resins. I am interested in evaluating these materials for

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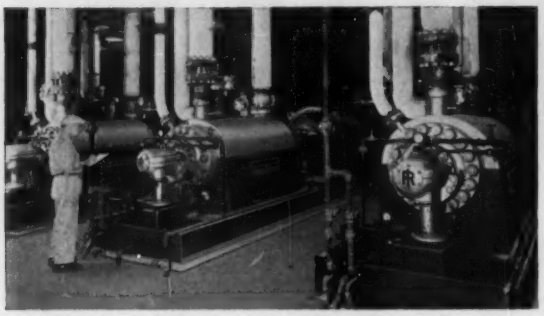
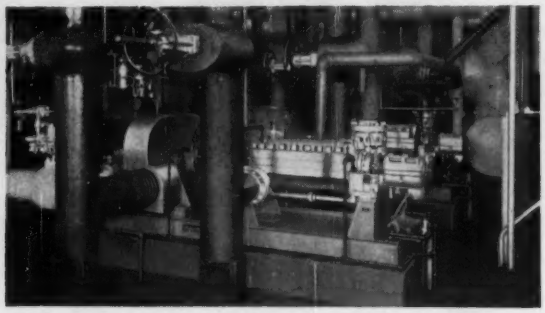
BOILER FEED PUMPS GIVE DEPENDABLE PERFORMANCE

at all pressures, capacities, temperatures.

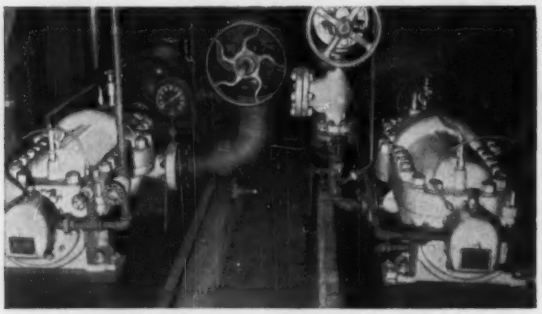
Typical I-R installations indicate wide range of use in central stations and industrial plants



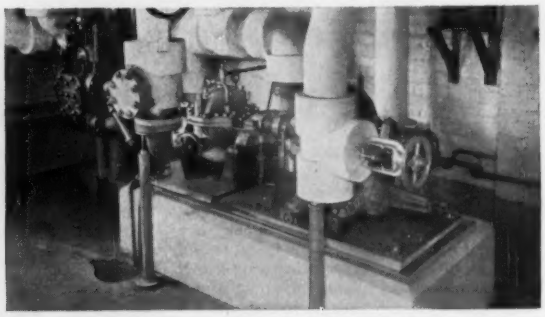
PRESSURES UP TO 6500 psi.—Class CHTA-CHTB: These multi-stage, cylindrical "double-case pumps meet the most exacting needs of the highest-pressure boilers in modern central station service. Each of the above pumps handle 1100 gpm of feedwater at 2395 psi.



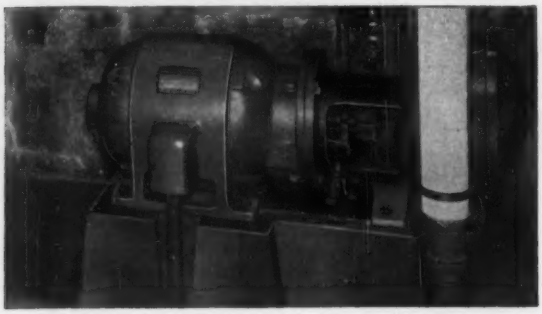
PRESSURES UP TO 1200 psi.—Class HMTA-HMTB: A complete line of multi-stage centrifugal pumps featuring a symmetrical, horizontally-split casing, and a simplified unit-type rotor assembly. The pumps illustrated are on boiler feed service in a large textile mill.



MEDIUM PRESSURES UP TO 1000 psi.—Class CNTA: Symmetrical design with unit-type rotor gives CNTA pumps higher efficiency, easier maintenance, and attractive modern appearance. Installed in a large paper mill, the boiler feed pumps shown operate at 3560 rpm and deliver 180 gpm at 605 psi.



PRESSURES TO 450 psi.—Class GT: Dependability is designed into this line of two-stage, horizontally split pumps. Standard construction includes renewable wearing rings and water-cooled, ring-oiled bearings. Pump shown serves as a boiler feed unit in a large candy factory.



PRESSURES TO 250 psi. — Motorpumps: A complete line of space-saving centrifugal pumps, including both close-coupled and cradle-mounted types. Single , two-stage, and vertical four-stage models are available. Pump shown is handling boiler feed in a leather factory.

Ingersoll-Rand boiler feed pumps have many refinements in design and construction that add up to high operating efficiency. Skilled manufacture and painstaking factory inspections assure dependability built into every pump. Inherent simplicity and ruggedness mean easier and less maintenance—and trouble-free performance.

Whatever pressure or capacity you need, Ingersoll-Rand can supply a boiler feed pump for the job. I-R engineers will gladly help you select the pump that meets your needs.

Ingersoll-Rand

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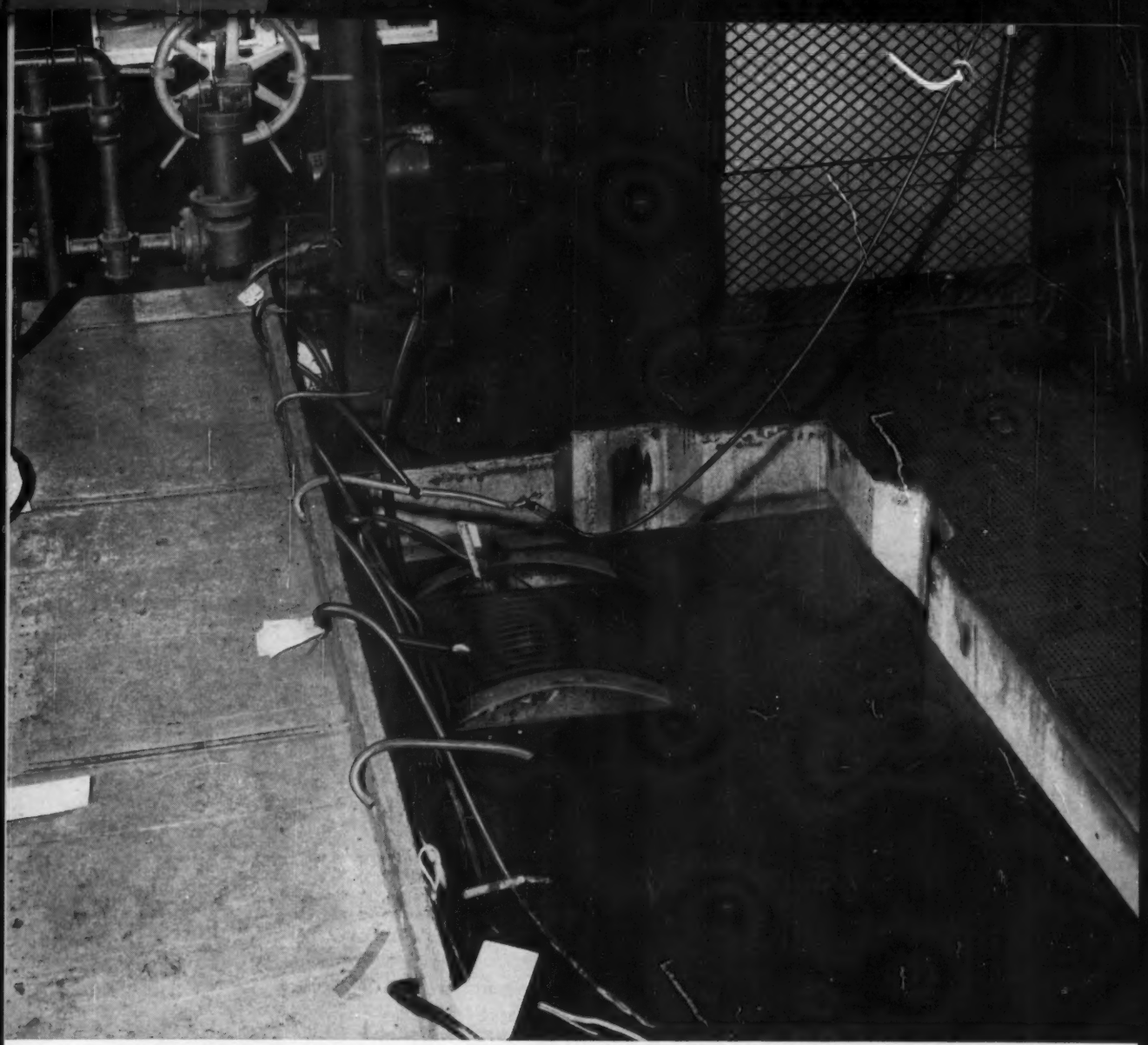


Anaconda 15-kv cable is subjected to 106 kv — 33% above industry standards with d-c. And tested at 25% above industry requirements with a-c.

15-KV CABLE GOES

Skin diving at 106 kv

Anaconda Type AB butyl-insulated high-voltage cable is tested under water at 600% overvoltage to assure you peak performance.

The fact that two high-voltage cables may look alike does not mean they'll perform alike. At Anaconda, 15-kv cable is tested at 106 kv with d-c for fifteen minutes. This voltage is 33% *above industry standards with d-c.* And in addition, Type AB is tested at 25% *above industry requirements with a-c.*

Only a vastly superior insulation can stand such high test voltage, even though there is no defect in the cable.

For your assurance of maximum service, Anaconda butyl-insulated cables are designed to perform far beyond industry requirements — in every important electrical and physical property.

New Engineering Bulletin EB-27 gives you full details on performance of Type AB insulation in 15 Industry Specification tests. Ask the Man from Anaconda for your copy. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 56294

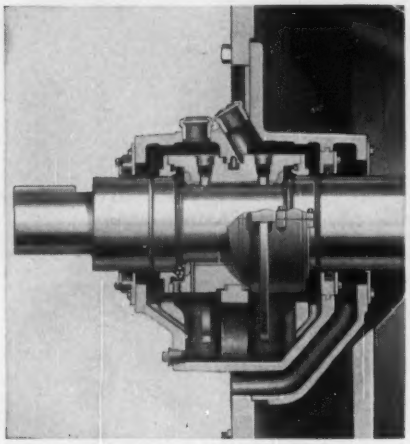
Get all the facts on Anaconda Butyl. Write today —

SEE THE MAN FROM ANACONDA®

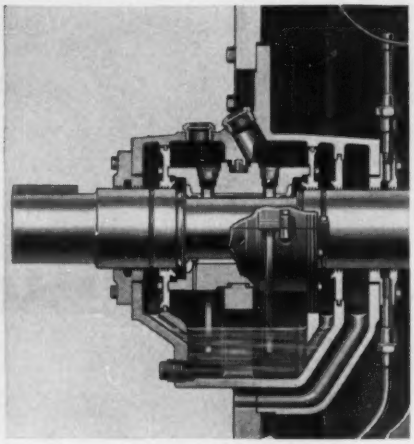
pioneer in **BUTYL INSULATION**

NEW Bearing Design Means Better Motor Performance

Allis-Chalmers capsule-type sleeve bearings now perfected for complete motor line



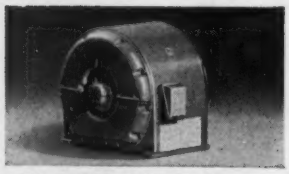
Standard capsule-type sleeve bearing



High speed capsule-type sleeve bearing

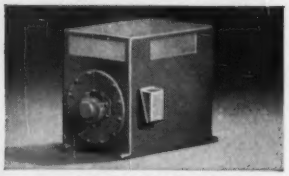
A new feature—an improved capsule-type bearing design—has been added to the Allis-Chalmers complete line of large end-shield bearing motors. This new bearing will give you better motor service, simplified maintenance and longer motor life through features like:

- Dust-tight, leakproof enclosure protects bearing from dirt, dust or abrasive materials.
- Venting system prevents oil leakage — keeps oil and vapor from getting into motor enclosure.
- Dual oil-rings insure bearing surface lubrication — either ring can adequately lubricate bearing.
- Split end-shield gives easy accessibility to winding and air gap — without disturbing capsule or bearing alignment.

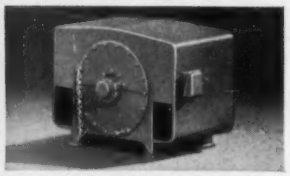


Drip-proof or splash-proof cage motor

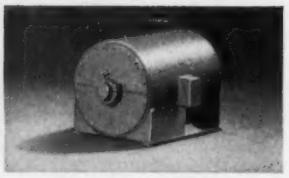
Synchronous or wound-rotor motor



High speed cage motor

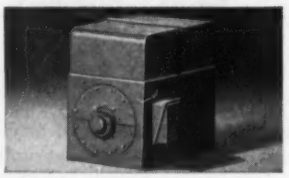


Weather-protected motor



Totally-enclosed fan-cooled motor

Totally-enclosed forced-ventilated motor



Water-cooled or inert-gas-filled motor

Capsule-type bearings are standard on these Allis-Chalmers motors.

You get MORE from Allis-Chalmers motors

More design and construction features — more application help. For complete information, contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

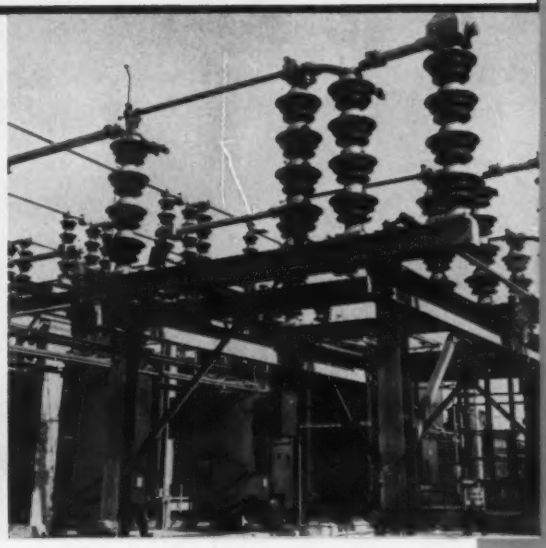
ALLIS-CHALMERS

A-5032

FROM SEATTLE TO NEW YORK IT'S THE TYPE wag SWITCH!

Southern States' switches being specified by more and more utilities

SEATTLE—City of Seattle, Department of Lighting, uses 44 Type WAG Switches with AMPLITACT® in its new Duwamish Substation, seen here, and 12 in its Shoreline Substation.



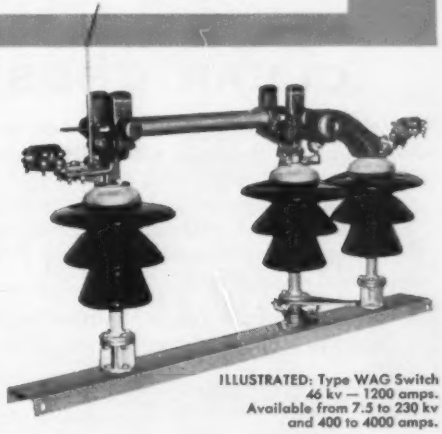
NEW YORK—Consolidated Edison Company's Astoria Generating Station uses Southern States 161 kv 1200 amp Type WAG Air Break Switches and G-WAG Grounding Switches.

Here is why growing numbers of Southern States' Type WAG Switches are being used throughout the nation:

Increasing generating capacities, with higher degrees of integration and corresponding increases in short circuit capacities, require switches that will meet these conditions.

The Type WAG carries its rated current indefinitely without excessive temperature rise and withstands high short circuits without damage. Even under the most adverse conditions, such as icing, the Type WAG can be depended upon to perform adequately.

All of the features are described in Bulletin 390-R. Get a copy from your Southern States representative, or write direct, and see why it will pay you to specify and use Type WAG Switches.



ILLUSTRATED: Type WAG Switch 46 kv — 1200 amps. Available from 7.5 to 230 kv and 400 to 4000 amps.

SS®

SOUTHERN STATES EQUIPMENT CORP.

HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

Installation of these two 5'-high SMS Bascule Gates on a dam 28' in height will enable the City of Decatur, Illinois, to more than double its present water storage capacity, even in dry years. The training wall and concrete pier between the gates is designed to minimize downstream cross-flow and damage to the apron. Harza Engineering Co., Chicago, Illinois, Consulting Engineers.

Individual 29'-long sections of the gate are installed in graphited bronze bearing shoes. A Bascule Gate was chosen over other types here when engineering studies proved it most economical and simplest.

View from downstream side shows final connection of one of the several hydraulic operating cylinders for each gate. Piping on the face of the dam immediately below provides individual isolation of any cylinder.

One of the two 500 psi oil accumulator tanks is about to be raised into position at the control station. Pumps supply pressure to the accumulator tanks for emergency operation in the event of power failure.

New SMS Bascule Gate Design Provides a CLEAR CREST, UNLIMITED LENGTH

Now SMS Bascule Gates can be built to any length you need, and installed without intermediate piers or overhead structures. With this new SMS design, hydraulic operators are located under the gate leaves and controlled from either end. The installation shown above consists of two 233'9" gates. They are the longest ever installed.

An SMS Bascule Gate will increase the storage and spillway capacity of existing dams quickly and economically. It enables you to control heavy run-offs without losing stored water, and to handle regional hazards like ice and heavy debris. In its open position, the gate lies flat on the dam crest and presents no obstruction to flow.

For full information on this new SMS Bascule Gate design—or on hydraulic turbines and other accessories—write to S. Morgan Smith Co., York, Penna.

S. MORGAN SMITH

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

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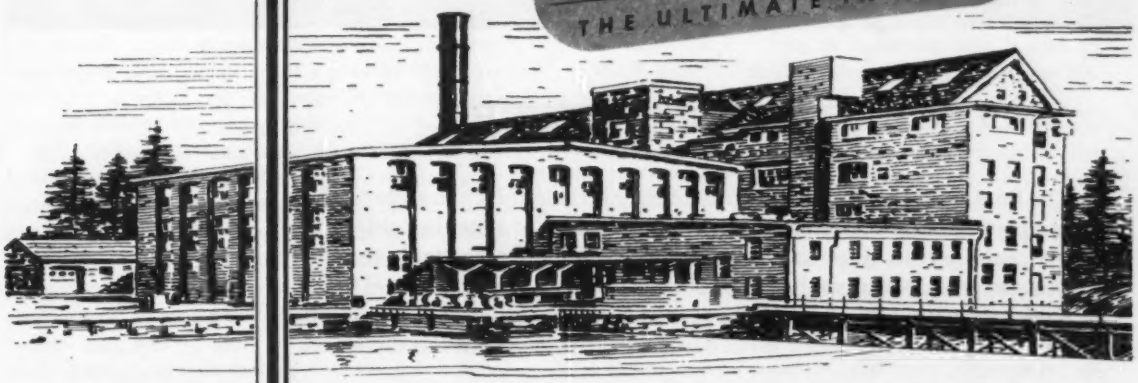

THE MACALLEN COMPANY

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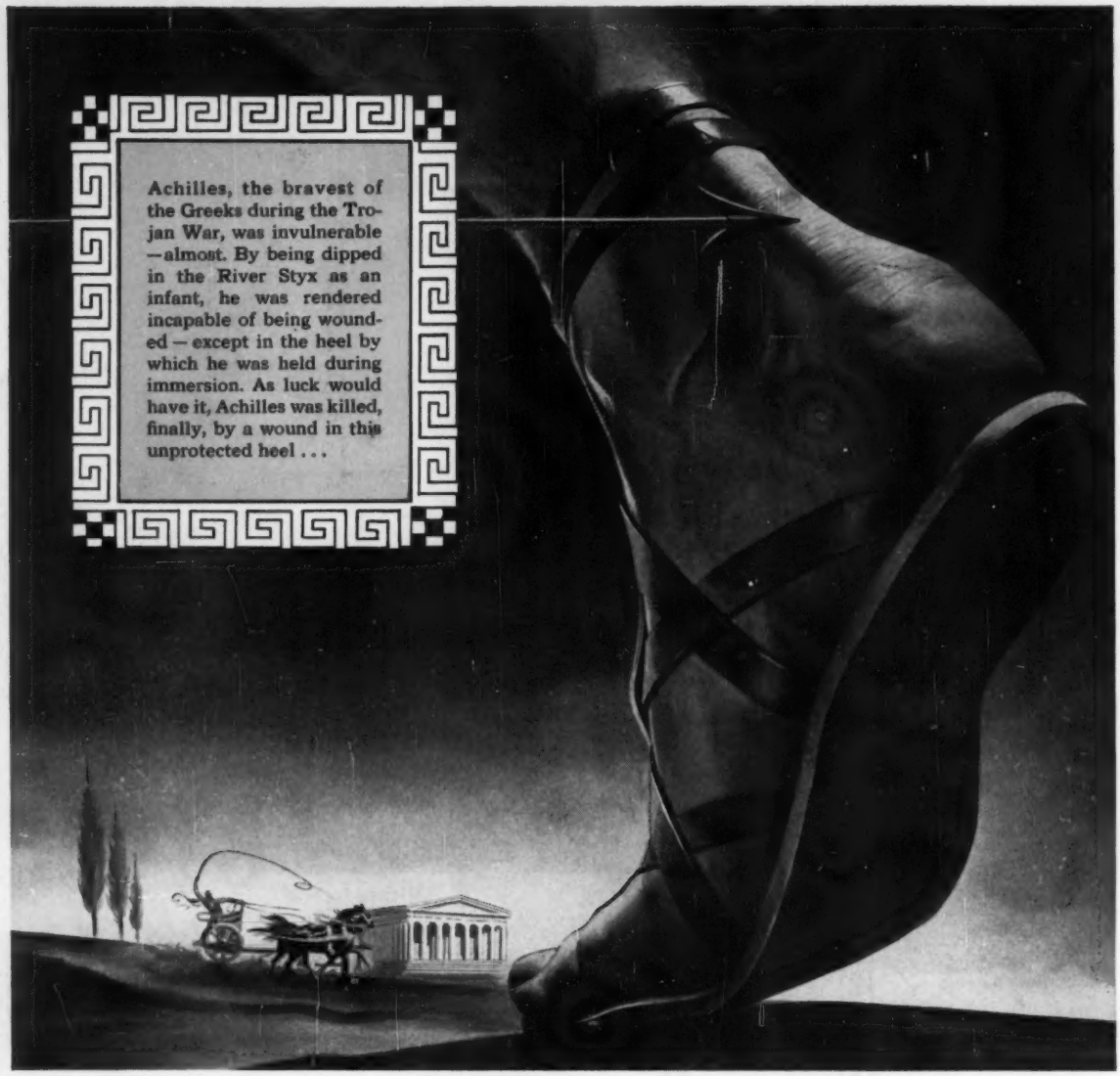
NEWMARKET, NEW HAMPSHIRE

CHICAGO: 565 W. WASHINGTON BLVD.
CLEVELAND: 1231 SUPERIOR AVE.


Achilles, the bravest of the Greeks during the Trojan War, was invulnerable—almost. By being dipped in the River Styx as an infant, he was rendered incapable of being wounded—except in the heel by which he was held during immersion. As luck would have it, Achilles was killed, finally, by a wound in this unprotected heel . . .

NO ACHILLES HEEL

The final test of most products for industry is their ability to withstand—*completely*—the corrosive effects of long periods of time. In cables this is especially true, since no part of any cable is more serviceable than its weakest point. Fortunately—but not accidentally—no Achilles heel limits Kerite insulation. Kerite cable in perfect working condition after 40, 50, and more years of difficult service is the rule, rather than the exception.

The value and service life of a product can be no greater than the integrity and craftsmanship of its maker.

Founded 1854

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.
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EDITORIALS

Load Growth Is Not Automatic

Present estimates show growth of 200% in overall industry sales to 1⅓ trillion kwhr by 1970.

The word "growth" seems to be part and parcel of everything connected with the electric utility industry today. From the platform speakers repeat it again and again. Load studies testify to it. The old handy statement that the business doubles every ten years now seems to be accepted as matter of factly as an algebraic axiom.

It is comforting for any man to know he has hitched his career to a growth industry. But therein lies a danger. So much has been said about the growth of the utility industry that too many people have come to believe that such growth is inevitable. The result is less attention to selling, to advertising and promotion.

This is shown very clearly in this issue's special report on store lighting (page 93). Kwhr consumption for lighting in stores could double in the next ten years—if some selling is done. If not, it will simply ride along modestly on the momentum of the market it serves. And if the dimensions of today's commercial selling efforts persist, this is probably what will happen. A survey on page 97 reveals it's getting worse instead of better. Manpower and money put into commercial promotion at present don't even keep pace with what was done in 1940. And all of this in spite of the fact that the market and selling opportunities have mushroomed during this 16-year period.

Load growth is not automatic. It will not come just because the charts and curves say so. If the inevitability which seems to be a frame of mind of many in the utility industry is so secure, then the appliance and equipment industry is foolish to spend all the money it does in advertising and selling. But it knows full well that if it should take such an extreme position, the public would very soon forget and begin to buy non-electric devices which even now are advertised in larger volume than their electrical counterparts.

Electric utilities face the same choice.

Evaluate Catastrophe Plans for Civil Defense

Last Friday most utility employees spent 15 minutes "under cover." This was the only public participation required by the Federal Civil Defense order. But for CD, getting people under cover was but an early phase of an elaborate nationwide test. Members of local groups spent a busy weekend, and the higher echelons are still analyzing the performance of their far-flung organization.

Basic premise in Operation Alert 1956 was that 125 atomic bombs were dropped last Friday afternoon in 76 target areas of the U. S., its territories and possessions. Explosive force of these bombs ranged from 20,000 to 5 million tons of TNT. CD's assignment was to practice planning evacuation and coordination of emergency resources, test communications and coordination with military assistance, assess damage, and determine what resources would be essential to survival under such an attack.

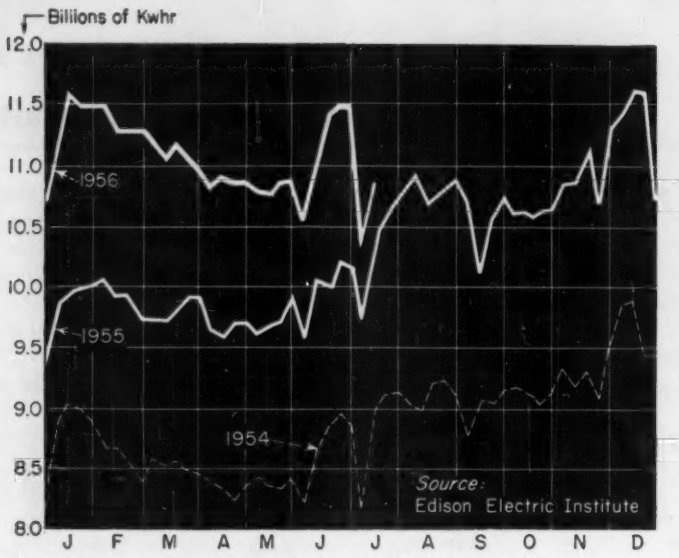
Coordinating emergency resources, testing communications, assessing damage, and determining what resources would be essential to survival are as vital to utility restoration plans as they are to CD. Utilities should parallel CD's self-evaluation with an evaluation of their own plans under the bombing pattern set for this national alert.

Much thought has been given this evaluation by Oklahoma Gas & Electric Co. How it would respond to an atomic bombing in its service area is told by W. B. Gesell, operations vice president, on page 84. He closes with this timely admonition:

"In an actual emergency the electric companies would be placed under . . . the Department of Interior to whom responsibility for electric service continuity has been delegated by the FCDA. The more initiative electric companies show in cooperating with civil defense authorities, the fewer will be the regulations telling our companies what to do."

Electric service has become a major factor in American living. It must be a major factor in the CD program. The best way to make it that is for all power suppliers to cooperate with CD leaders in planning to cope with civil emergencies. And utility customers must be told enough, despite the silence imposed by security restrictions, to convince them that the utility to which they look for leadership in peacetime emergencies will stand by them in war.

ELECTRICAL WEEK



OUTPUT

Week ended July 14
10,878,000,000 Kwhr
Up 4.2%

Atomic Energy Commission requirements—1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 2.0%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
July 14	+4.2	+5.3	+0.4	−0.2	+9.9	+6.4	+11.3	+9.8	+11.8	+6.4
July 7	+6.5	+6.3	+0.2	+3.1	+4.5	+7.4	+17.2	+13.1	+12.4	+8.6
June 30	+13.4	+11.2	+9.5	+16.8	+13.6	+12.5	+17.1	+11.4	+10.9	+12.9

Seasonally Adjusted Index 209.5 Week Ago 214.9 Year Ago 202.1

Issue's Highlights . . . Dixon-Yates contract called "null and void, and contrary to public policy" in Justice Department brief . . . Hearings on Pacific Northwest Power's Snake Dam proposals show strong opposition to federal project . . . Massachusetts legislature expected to empower tree wardens to authorize removal of trees that might disrupt electric service during hurricanes . . . Most countries at World Power Conference look to atom power as a savior . . . Treated asbestos arc-proofs high-voltage cables in Con Edison manholes . . . New test stand enables engineers to check water wheel as turbine or pump without changing hydraulic set-up.

Electric output falls off in week of July 14 with only 4.2% increase over same 1955 week, while two weeks ago output was up 13.4% (see above chart). Eliminating AEC use, July 14 output is up only 2%. **Reasons:** Steel strike, miners' holiday, cooler weather, and factory-wide vacations.

As EW goes to press, **Westinghouse Electric expects to resume production July 19** at its Sharon, Pa., transformer plant. Union members voted to terminate 6,000-man "wildcat" strike after company issued ultimatum. Strike began July 14 in retaliation for indefinite suspension of two IUE members for roughing up a man who had returned to work during previous strike. Their suspension was subsequently changed to dismissal. During the strike violence included the stoning of Division Manager John H. Childs' home.

Philip Sporn, president of American G&E, tells New York Society of Security Analysts that **450-Mw generating units are now justified** because each will not exceed 8% of system capacity when it goes in service in 1959. Each jump in unit size since 1941 has been 6.8 to 7.6%. Choice of 3,500 psi 1,050F/1,050F/1,050F for the new supercritical units will give 5% gain in thermal efficiency for 7½% less investment per kw, Sporn says.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire . . . Gore Bill for large government reactors **is cleared by House Rules Committee and sent to House floor.** The Committee ruled that debate will be limited to two hours . . . Rules Committee **approves proposed exemption from Public Utility Holding Co Act** for non-profit groups building research and development reactors. Early House debate is expected . . . **Idaho Power challenges U. S. Supreme Court jurisdiction** to rule on company's FPC Hells Canyon license. The utility contends high court can't enter case because there has been no final ruling by lower court . . .

A government interagency committee, set up four months ago to advise Office of Defense Mobilization, is formally handed **industry arguments that federal procurement of hydraulic turbines be limited exclusively to domestic producers.** Group expects to make recommendations in couple of months . . . **REA okays loan** of $17 million to Central Nebraska Public Power and Irrigation District for 100,000-kw steam power plant.

Pacific Power & Light and Cowlitz County (Wash.) PUD **agree on joint development of Washington's Upper Lewis River.** PUD will pay 26% of cost of PP&L's $56.7-million Swift hydro project in return for 26% of its output. Pact calls for sharing any new projects to be developed downstream.

General Electric chalks up record sales and earnings for first six months this year. Sales climbed 17% to $1,958,974,000, and net earnings are up 5% to $112,-864,000. Earnings for the half are $1.30 per share, while in the like 1955 period they amounted to $1.24 a share.

Five-day strike ends at Kansas City P&L as company and IBEW agree to two-year pact. Irving Fane, company counsel, says contract, retroactive to July 1, provides for 6½% increase including wages and fringes.

First Boston Corp group **wins $40-million Union Electric** first mortgage 3¾% bonds due 1986 with a bid of 101.639%; reoffers at 102.367% to yield 3.62% . . . **Kansas P&L offers** 270,000 common shares to public at $23.25 to yield 5.16% through a group managed by First Boston.

ABOUT PEOPLE IN THE INDUSTRY

"All the facts point, without contradiction, to the **very urgent need for a full and complete investigation of the government's power marketing policies** by a legislative committee of Congress," declares **Frank M. Wilkes,** board chairman of Southwestern G&E. He appeared before a House subcommittee on Interior and Insular Affairs to oppose rate increase proposed by Interior Department for Southwestern Power Administration.

Sen B. B. Hickenlooper (R-Iowa) declares the Senate-passed Gore Bill "is not necessary." He says the bill for government development of big power plants "authorizes an additional $400 million for a purpose which is not in itself well defined and for a purpose which is already provided by existing legislation." He observes that "a program of this kind would only add a duplication of facilities."

More News About People page 184

Dixon-Yates Contract Called Unlawful

Government's request that Court of Claims throw out $3.5-million cancellation of contract claim centers on 'conflict of interests' charged to Wenzell (left)

Justice Department, headed by Brownell (right) calls controversial contract "unlawful, null and void . . ."

The Eisenhower Administration—which arranged the Dixon-Yates power contract and then cancelled it—now calls the controversial contract "unlawful, null and void, and contrary to public policy."

In this tough language, the Administration asked the U. S. Court of Claims to throw out a claim for over $3.5 million filed on behalf of the Dixon-Yates group as alleged damages caused by cancellation of the contract. The Atomic Energy Commission—primary federal agency behind the project and signer of the contract with the Dixon-Yates group—cancelled the contract a year ago on orders from the President.

The Department of Justice's legal brief has already caught the eye of Democrats who see it as important campaign material. Several Democratic senators—particularly Tennessee's Albert Gore and Estes Kefauver—led a long, bitter fight against the contract. Democratic pressure and investigations of contract negotiations finally forced the Administration to withdraw its support.

The brief says the contract was not legally binding on the government and so no money can be collected for its cancellation. To back up these points, government charges that:

- The activities of Adolphe H. Wenzell in helping negotiate the contract between the government and the Dixon-Yates group—both advising First Boston Corp on financing for Dixon-Yates as a first vice president of the firm and advising the government on the contract as special consultant to the Budget Bureau—involved a "conflict of interest so contrary to public policy as to render the alleged agreement null and void";
- Action of the Republican-controlled Joint Committee on Atomic Energy to speed up the contract in late 1954—waiving a 30-day waiting period before the contract could become final—was "invalid";
- The contract failed to meet the requirements and violated the provisions of the Public Utility Holding Company Act of 1935;
- The contract left so much discretionary power in the Dixon-Yates group to decide when commitments were to become binding that it does not meet the formal requirements essential to make it enforceable.

On the conflict of interest issue, the government says Wenzell was employed in 1953 and 1954 as a Budget Bureau consultant on problems involved in expanding electric facilities in the Tennessee Valley Authority area. At the time, the Budget Bureau and AEC were both actively engaged in development of the project. According to the government, Wenzell in his Budget Bureau capacity advised and

Status of Major Power Bills in Congress

Measure	Senate	House
Hells Canyon: One federal dam costing $484 million instead of private development of Snake River, Idaho	Up for floor debate	Rules Committee
Fryingpan-Arkansas project in Colorado	Floor debate	Rules Committee
Niagara Redevelopment: N. Y. State Power Authority to develop Niagara, sell power to preferred customers	Passed	Rules Committee
Upper Colorado Project: $760 million for 4 reservoirs, 12 irrigation projects involved	Passed	Passed
Gore Bill: Development of power reactors for AEC at $40 million, no limit set	Passed	Up for floor debate
Atomic Liability Insurance: Government underwrites $500 million on private power reactors	Passed	Rules Committee

represented the government in important contract negotiations, including costs of construction and costs to the Dixon-Yates group in selling securities to finance the project.

At the same time, says the government, Wenzell was a salaried vice president of First Boston and advised and represented the firm on its relations with the project and also advised the Dixon-Yates group. In short, says the government, Wenzell helped negotiate the contract which resulted in employment of First Boston as sales agent for disposing of Dixon-Yates securities. The government argues that the agreement signed was void because the Dixon-Yates group had full knowledge of Wenzell's "duality of interests and relationships."

Government Reverses Stand

The government's stand on the 1954 Atomic Energy Act conflicts with the previous official opinion of Attorney General Brownell. In late 1954, Brownell said the 1954 act did give the government sufficient authority for the contract. But the government brief now takes the position advanced by Democrats who, after staging a filibuster that failed to block the section of the law designed to authorize the contract, said the law still did not authorize Dixon-Yates.

Legal Points Disputed

The law permits AEC to sign new contracts for electricity in connection with operation of AEC installations at Oak Ridge, Paducah, and Portsmouth, including contracts for "replacement" of TVA power used by AEC. The government now says the contract was not made in connection with operation of any of these installations and did not provide for a "replacement" within the meaning of the 1954 act.

The 1954 law also provides a 30-day waiting period for any contract made by AEC under the law, during which the Joint Committee on Atomic Energy could review it. The law allows the committee to waive this period, and the Joint Committee in late 1954 —voting on strict party lines—waived it on the Dixon-Yates contract. When Democrats took over Congress in January, 1955, they immediately rescinded the waiver.

During later proceedings before the Securities and Exchange Commission in connection with financing of the project, the Administration—then still backing the contract—argued the Joint Committee could not legally rescind the waiver. But the brief now filed says the waiver originally voted in 1954 by the Republicans was no good, because Congress was not in session at the time and the contract submitted was not final or complete.

The government, in addition, says the contract technically violates the Public Utility Holding Company Act. The government relies on provisions in the act that make it illegal for a holding company to receive any indemnity or payment from any of its subsidiaries. Among other things, the contract obligated the operating companies of the sponsoring holding companies—Middle South Utilities, Inc, and the Southern Co—to pay a share of certain costs and expenses of the project if not fully paid by AEC.

The government also argues that the contract was not binding when cancelled because Dixon-Yates had not yet received SEC approval of sale of its securities under the Holding Company Act. The contract provided that before the obligations created were to become binding, the Dixon-Yates group had to have all necessary regulatory approvals. But at the time of cancellation, SEC had only approved Dixon-Yates equity financing arrangements—accounting for about 5% of the total financing. SEC action on the bond issue—the bulk of the financing —came to a halt and was never completed when the contract was cancelled.

PNWP Backed on Snake Dams

Results of Federal Power Commission hearings in Lewiston, Idaho, seem to confirm continuing strong lay opposition to federal power projects in the Northwest. An FPC examiner, listening to arguments for and against private development of Mountain Sheep and Pleasant Valley dams on the Snake River, found that 57 witnesses supported the private power proposal while 20 voiced opposition.

The two-day Lewiston hearings were similar to sessions held earlier at Pendleton, Ore., on non-technical aspects of the projects. Technical hearings are scheduled in Washington, July 24.

The dams are planned by Pacific Northwest Power Co, a combine of four private power companies. Proposed alternate is a federal Nez Perce dam to be located on the Snake below the Salmon River mouth.

Most opposition came from publicly owned utilities and labor groups. But one utility, Eugene (Ore.) Water & Electric Board, backed PNWP's proposal, as did four International Brotherhood of Electric Workers locals and the Spokane Teamsters local.

Idaho spokesmen stressed increased tax benefits to Idaho from private construction of the $213-million project. State Sen Ralph Wickberg, electrical contractor and 1955 chairman of the state's Legislative Revenue and Taxation Committee, said:

"Mountain Sheep and Pleasant Valley dams are excellent examples of business enterprises which will furnish a large capital addition to the ad valorem base in the state of Idaho.

"According to figures I have seen," he continued, "at least $90 million of value of dams and transmission lines will be allocable to Idaho. The proportionate part of net income accruing to Idaho will also be subject to tax plus ½ mill per kwhr. These plants will help build our schools and provide other state and local services."

Local State Units Voice Support

Sportsmen's organizations were unanimous in support of the PNWP projects. Theo H. Wegner, representing the 20,000 members of Idaho Wildlife Federation, declared:

"Sportsmen have been greatly encouraged by the studies in which PNWP has participated to protect fish life, and we have no doubt that funds will be set aside and some acceptable compensation brought about."

Statements supporting the 1,446,000-kw private project were entered by Idaho State and North Idaho Chambers of Commerce, and by seven local chambers. Four mining firms—Bunker Hill, Hecla, Anaconda, and Pend Oreille Mines & Metals—also favored the private plan.

In a lengthy opposition report, Angus McDonald, Washington representative of the Farmers Union, charged that "financial groups in New York City are attempting to control the power companies and to take away the power resources of the Pacific Northwest." He asserted there are close financial ties between Ebasco Services, Inc, and PNWP's four firms.

Wind, Wires, and Trees

With an eye toward the hurricane season and possibilities of disrupted electric service, the Massachusetts State House of Representatives, in a voice vote, empowered municipal tree wardens to authorize cutting, trimming, or removal of trees which interfere with power lines. No public hearing is necessary. The bill should pass the Senate and win the governor's signature.

If the warden refuses to grant a permit, the Department of Public Utilities may do so after a public hearing, if cause seems justified.

It was brought out that to force state utilities to go underground with wires would involve a $3-billion outlay—surely to be reflected in rate schedules, and such legislation "cannot be justified from any standpoint," a special committee reported to the House before the vote. Moreover, Massachusetts customers pay for underground connections. Under best conditions, this cost runs $150. It would be several times more in other cases. Consumers would refuse to pay for the changeover, the special committee observed.

Geothermal Contract Signed

New Zealand will have its first geothermal power station in October, 1958, if construction schedules are met. A contract has been signed covering erection of the 69,000-kw power house on the banks of the Waikato River, a cooling water pumphouse in the river, and five 20-in.-diam pipes to carry steam from bores about a mile away. Construction will be undertaken by four firms representing Britain, Scotland, Switzerland, and New Zealand.

TVA Gets Set for A-Plants

The Tennessee Valley Authority has sent several of its steam plant engineers to Atomic Energy Commission laboratories to learn about the "complex technology of nuclear power."

According to the July edition of "Teamwork," published by TVA and the Tennessee Valley Trades and Labor Council, TVA is preparing for nuclear power plants it may get in the future. "Within the next few years TVA engineers may begin the planning and design of such plants" for the TVA system, the publication said.

The ECAP Ad and the Atom

Sen Clinton P. Anderson (D-N.M.), chairman of the Joint Committee on Atomic Energy, has fired another barrel at ECAP's "atomic power" advertisement (EW, June 25, p 102). "I must recommend . . . that (Congressional committees) study the regulatory systems which allow the American consumer of electricity to pay for misleading advertisements intentionally designed for lobbying purposes," he said. But Sen Anderson's voiced concern for the consumer's wallet contrasts sharply with his action. He is co-sponsoring the Gore bill which could cost taxpayers at least $400 million.

The senator also believes Atomic Power Development Associates' proposed reactor may be hazardous, and cited a letter written by Atomic Energy Commission's safety committee. But Robert W. Hartwell, assistant general manager of the company building it, pointed out that the reactor's safety development is still in a premature stage.

Chudoff: At It Again

"A definitely organized effort by the Arizona Public Service Co, the Idaho Power Co, the Montana Power Co, the Utah Power & Light Co, the Public Service Co of Colorado, and Ebasco Services, Inc., to influence the Secretary of the Interior has been uncovered," asserted Rep Earl Chudoff (D-Pa.), chairman of a House subcommittee investigating electric utilities.

Republican minority members stated: "The judgment of guilt has been pronounced and it appears we are now to sit back and watch the majority and its staff attempt to shore up its wall of prejudice in its continuing attempt to promote socialization as a national policy."

Colin W. Raff, executive assistant to the president of Montana Power Co, indicated that Chudoff aimed to establish something sinister and conspiratorial about a 1953 booklet "The Federal Power Program" sponsored by five utilities.

"I am surprised at the implication that there is anything improper about the book," he said, "especially in view of our nation's protection of the rights of free speech, free press, and free petition."

Minority members told company witnesses: "Reprehensible as it is . . . you have already been convicted. With no concern for what the testimony may reveal . . . the chairman has capriciously pronounced his judgment (in his press release announcing the hearings)."

Rep Clare E. Hoffman (R-Mich.) called the hearings "another witch hunt."

FP&L to Keep Franchises

Citizens in Sanford and Arcadia, Fla., have expressed continuing confidence in Florida Power & Light Co by voting to let FP&L keep its franchises. At Sanford, the new franchise was adopted unanimously by the City Commission after vote approval of citizens. The freeholders of Arcadia voted nearly 4 to 1 in favor of granting the utility a new franchise. In both cases, municipal ownership of an electric generating plant and a distribution system had been proposed. Earlier, Lake City voters defeated by a 3-to-1 margin a plan that would have put the city into the electric business.

World Power Hinges on Atom

- **World Power Conference delegates told that power shortage will develop in 30 years if nuclear energy does not become practical for fuel-scarce countries**

- **Status of nuclear development described for Britain and Russia. Sweden will try reactors for district heating**

- **Interest shown in U.S. super-critical plants and in French hot-air plants using coal firing and gas turbines**

- **France to build 3,500-kw plant using temperature differences in tropical ocean layers to run turbine**

J. H. M. SYKES, Bedford, England

All countries except the United States face a power shortage that will become increasingly acute in the next two or three decades if atomic power does not come through as a savior.

With this observation hanging over the Fifth World Power Conference, in Vienna, delegates attacked problems of the present and future electric industry to thrash out what could be done, and to learn what is being done.

International power exchanges, the status of atomic power experiments, steam, hydro, and miscellaneous methods of generating electricity were discussed by leaders of the electric industry from all points of the globe.

S. Logan Kerr of S. Logan Kerr & Co, Inc, Flourtown, Pa., described how interconnections between utilities in the U. S. had gradually developed into great grid systems. He listed the ever-increasing advantages of large-scale interconnected supply systems.

Papers presented in this session revealed that vast programs of hydroelectric power development are being executed in Siberia and other parts of Russia, and that the Russians propose to exchange power with Finland and Norway, particularly with regard to hydro power developed on boundary rivers.

The Chinese Peoples' Republic delegates indicated the country has large water power reserves, but that it is short of power. Industrial development, although still at a low level, is rapidly increasing.

A Russian speaker said three large interconnected grid systems in the Soviet Union supply from 28 to 32-billion kwhr. The greatest length of single lines amounts to 1,000 km. Transmission capacity is 550 Mw per line at 400 kv. By 1970, an estimated 400 billion kwhr will be produced within this interconnected system.

H. L. Melvin of Ebasco Services, Inc, New York, said in his opinion a super grid system will extend over almost the whole U. S. in a few years' time.

Atomic Power Developments

In two sessions, it was tacitly agreed that the stage has not yet been reached when nuclear power can be considered seriously with respect to developments in the next 20 years—at least not in countries other than the U. S., the Soviet Union, Great Britain, and France.

It was shown that Great Britain presently is leading the world in practical atomic power development, because the first half of the 92-Mw Calder Hall plant has been operating since May. The entire plant will be ready for commissioning in October. Britain has three large nuclear plants of the order of 200-250 Mw under active planning. Two are for Central Electricity Authority, and one is for the South of Scotland Electricity Board. Britain's ratio of nuclear to thermal and hydro plants is to rise from 10% in 1965-66 to 28.8% in 1980-81.

The first reactors will be of the natural uranium type, and a British paper pointed out that as long as the reactor must be looked on as a source of relatively low-grade heat, the possibilities of subsequently injecting high-grade heat into the steam through a fossil-fuel-fired superheater will not be neglected.

Plans for the first two Central Electricity Authority stations will be approved this fall, and it is confidently anticipated that experience so far gained will indicate that the capital cost per kw will be almost half the figures previously expected.

Competitive Nuclear Power

Titus G. LeClair, Commonwealth Edison Co, and Ulysses M. Staebler, U. S. Atomic Energy Commission, reported that nuclear developments in the U. S. so far have reached the point where atomic power could be competitive in the U. S., even in the light of its great wealth of natural resources.

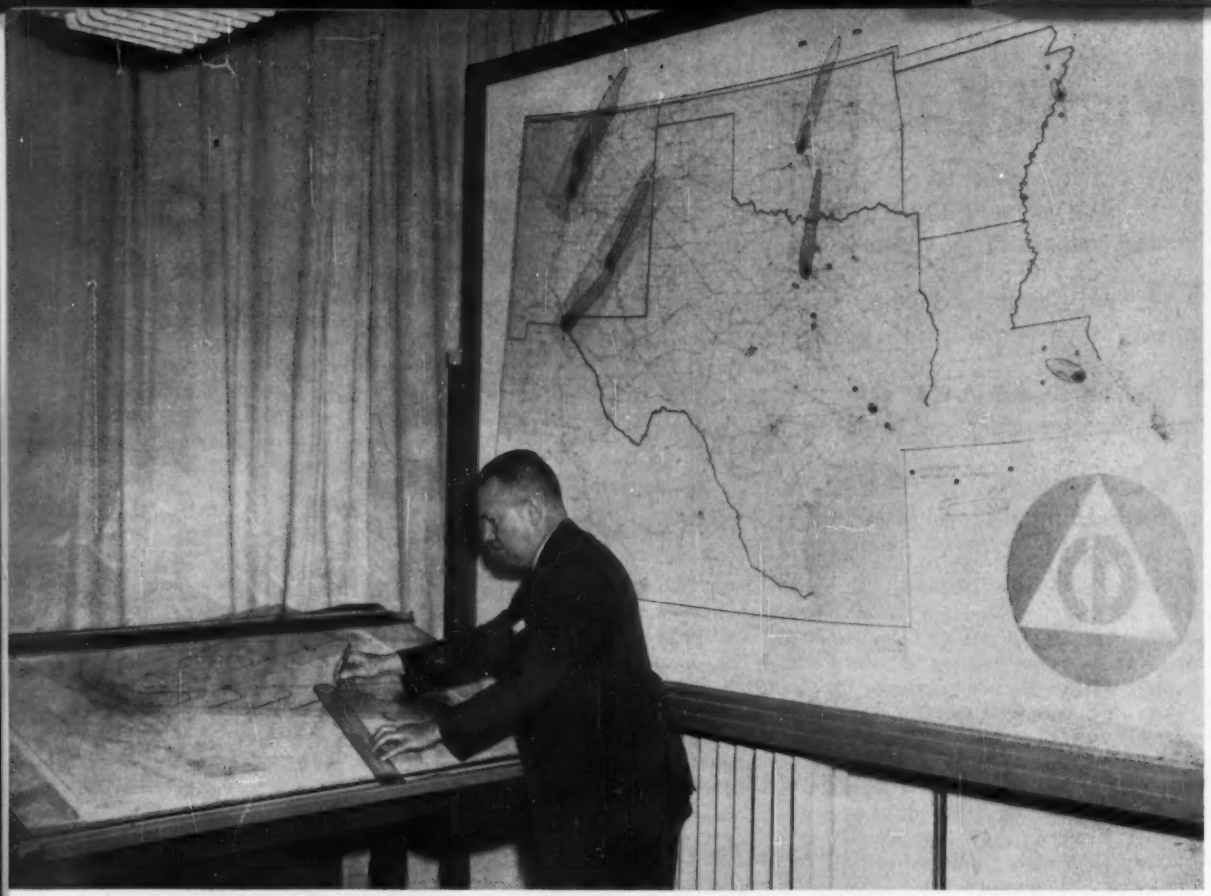
Russian Delegate Kasatschkovsky said a 5,000-kw nuclear power plant has been operating reliably and economically for two years in the Soviet Union. Boiling water reactors, homogeneous breeding reactors and fast reactors are under experiment, and several stations up to 600 Mw in capacity are being planned, he said.

Other nuclear-power highlights: Sweden is developing a reactor for district heating duties; France is preparing three reactors for power production—one at 5,750 kw and the other two at 28,000 kw each; the Dutch plan intensive research into homogeneous suspension reactors of both wet and dry types, and are building a prototype reactor at Kema laboratories in Arnhem.

Prof Broda, Vienna University, summed up the atomic power sessions

(*Continued on page* 198)

G. A. Hathaway, national committee chairman speaks at opener.



AFTER A-BOMB FALLS a Weather Bureau meteorologist prepares overlays indicating upper-air wind direction of nuclear fall-out. He is working at Federal Civil Defense Administration's Region 5 headquarters in Denton, Texas

Oklahoma G&E Holds Atomic Drill

- **Dropping of theoretical nuclear bomb touches off seven-day test; OG&E works closely with Civil Defense agency**

- **Companies steady loads by interconnections; use all facilities to get lines and generating stations back in service**

W. B. GESELL, Vice President—Operations, Oklahoma Gas & Electric Co, Oklahoma City, Okla.

On Friday, July 20, at 1:15 PM, a theoretical atomic bomb was dropped in Oklahoma Gas & Electric Co's service area under a practice alert.

We had four hours warning from Federal Civil Defense authorities in Denton, Texas, that bombers had been sighted flying in our direction in the simulated attack.

Under a disaster plan conceived years ago, all employees reported for emergency assignment. They had been briefed in advance on what to do if Oklahoma City were attacked.

Our job, along with that of other electric companies in the Southwest, is to keep power loads steady through a system of interconnections. That is the main over-all objective.

Locally, we must get our own communications—transmission and distribution lines—back into operation as quickly as possible. We must locate what lines and generating stations are knocked out by the bomb blast and get them back in service, using everything at our command.

We are, at the moment, mid-way through the July 20-26 alert, and things are going smoothly. Here is what happened last Friday evening after the theoretical nuclear bomb was dropped in our territory:

Local civil defense workers and OG&E's two-way radio-equipped cars sped to the scene where the bomb fell. They radioed back reports on the extent of the damage as stated in the civil defense problem.

Otis Howard, OG&E manager of operations and emergency director under our civil defense plan, was already at the company's main office. He was summoned by telephone as soon as FCDA headquarters in Denton, Texas, notified us that bombers were headed our way.

Howard declared a "state of emergency." Our carefully drawn, well-practiced emergency plan was put into operation. Under it, almost every employee of the company is assigned a job.

EMERGENCY MOBILE SUBSTATION is alerted and ready to roll as substitute for any sub knocked out by nuclear bomb

W. A. Kitchen, second in command to Howard under our emergency plan, assumed his company duties of checking the damage and getting a start on restoration of service. Kitchen, who is also our liaison officer with the State and local civil defense organizations, directs the setting up of our own communications in coordination with theirs and with the FCDA office in Denton.

In the main we are self sustaining and operating with sufficient equipment and material. We are getting good results from the personnel—particularly from those who have received special training in detecting contaminated areas.

Reconstruction and restoration of service are progressing satisfactorily, and the power supply is adequate to care for the drastically reduced load.

Our work in the first three days of the alert has consisted of:

1. Removing hazards such as fallen wires and poles.

2. Restoring service, primarily to hospitals, medical centers, first aid stations, and food and clothing disbursal

SCOUTING CREW takes radiation reading to determine if OG&E personnel can enter area. This report is sent to the company headquarters over two-way radio

INSTRUMENTS: (l to r) radiation survey meter, dosimeter and dosimeter calibrator, and radiation detecting meter

DOSIMETER, worn in shirt pocket, determines degree of radiation exposure

RADIATION EXPOSURE is counted by checking dosimeter. If man's radiation dosage passes a certain point, he is not allowed to reenter contaminated area

centers. This has required the installation of three portable generating stations until pole lines can be repaired.

3. The placing of portable substations to provide primary service to large occupied areas previously served by stations put out of use.

It was determined that the bomb blast knocked out 40,000 kw of load. The evacuation of people and closing of stores and plants caused a further load reduction.

This automatically solved the problem of four power plants being in various degrees of radioactive contamination. One 45,000-kw plant was rendered inactive. The other three were not so seriously affected, and shortly after the fallout ended, it was possible to begin removal of contamination by washing the structures and equipment.

The radiation test crews are still working in the field. At this time we cannot enter an oval radius of five to ten miles around ground zero. All within this area has been isolated from power supply. It isn't needed—no one is alive there.

We have secured from the government some of the instruments for measuring radiation. We have trained our line crews in the handling of radiation survey meters, dosimeters, dosimeter calibrators, and radiation detecting meters.

The areas where we can and cannot work are determined by two-man scouting crews equipped with a SID-1 radiological survey meter. This registers the number of roentgens per hour or the rate of radioactive contamination.

In addition, each man is equipped with a fountain-pen-type dosimeter clipped to his shirt pocket. The dosimeter gives a reading of the total roentgen dose absorbed by the man. In no case are we letting that dosage rise above 50 roentgens, and even this will not permit the individual to reenter a contaminated area during the period of reconstruction.

In determining the workable areas we are considering no man to be expendable, and we are complying with the sound rules of safety. The fact that we have contamination-detecting instruments on hand and have trained our men to use them is expediting progress without exposing the workers to unnecessary hazards.

One of the forward steps we have made in the Southwest in our civil defense work is the obtaining of approval from federal, state, and local civil defense authorities for arm bands and identification cards to be worn by our employees and for official Civil Defense insignia to be displayed on our trucks.

These insignia assure us that our line crews are able to enter any emergency area in time of nuclear catastrophe to service our property without the chance of being turned back by civil defense workers patrolling or policing the area.

The insignia, approved officially by Region 5 of the Federal Civil Defense Administration, is recognition that the work of restoring electric service ranks right along with that of the civil defense authorities, the Red Cross, and even the Armed Forces themselves.

It is good to know that the FCDA authorities are aware that restoration of electric service is an integral part of rehabilitation of a bombed area to normal civilian life.

More than that, it is recognition that in the time of air attack it is vital not only to get civilian life back to normal but, in addition, to get power restored to industrial areas so that factories may begin turning out the armaments needed to combat any enemy that attacks us.

In an Actual Emergency

In case of an actual emergency the electric companies would be placed under the jurisdiction of some kind of government organization like the Defense Electric Power Administration that was set up during the Korean War.

The DEPA would be operated under the administration of the Department of Interior to whom responsibility for electric power service continuity has been delegated by the FCDA.

The more initiative the electric companies show in cooperating with civil defense authorities, the fewer will be the regulations the government will issue telling our companies what to do.

Pres Hooven pins Pres-elect Coover . . . presents Lamme Medal to C. R. Hanna as . . .

AIEE Tackles Growth Problems

Engineers reveal new steps in expanding systems economically to carry mounting loads, deliberate engineering shortage and professional ethics

Substantially every major facet of electric power engineering had a place on the program of the American Institute of Electrical Engineers at San Francisco late last month. The Summer General and Pacific Meeting placed unusual emphasis on professional ethics and training young engineers. And the technical sessions revealed new attainments in transmission, distribution, cable, substations, system engineering, power generation, nucleonics, and power utilization.

Evident throughout the sessions was a high level of professional enthusiasm and a determination to continue the rapid pace of engineering advances. Highlights of technical sessions were:

- Justification of 230-kv transmission, except for one long line at 345 kv, to tie Pacific Northwest Power's proposed 1,446-Mw hydro output to the Northwest Power Pool.
- Savings of 25% on 230-kv double-circuit transmission by boosting conductor tension and spacing towers 1,320 ft apart.
- A new approach to calculating lightning stress on transmission lines.
- Justification of switched capacitors to attain 99.1% power factor on distribution circuits.
- Development of a self-sealing gap to protect capacitors in series with distribution transformer primaries.
- Emphasis on transformer design for 2-BIL-step cut in insulation.
- Tie line control gives best performance when its bias setting matches interconnected system governing response.
- Modification of steam plant cooling water system to provide separate control of oil and hydrogen temperatures.
- Using main transformer tertiary to drive steam plant auxiliaries.
- Picking up full load in 3 sec on hydro turbines.
- Improving the load factor of electrically heated homes by limiting their individual peak loads.

Advancement of the engineering profession was treated from several angles. Among these were:

1. Overcoming the shortage of engineers.

2. Getting young engineers from college into industry.

3. Ethics in engineering practice.

The shortage, said Dr F. E. Terman, Stanford University, could be laid to "a depressed wage scale for engineers. A substantial increase in wages would exert corrective influences. Because engineers and scientists would be more expensive, employers would use them more carefully. And because there would be greater rewards for those who succeed, a larger supply would develop."

But Prof L. N. Stone, Oregon State College, warned that the demand for engineers will continue to exceed the supply because college output is limited to boys with suitable aptitude.

Survey information presented by M. S. Oldacre, Stanford Research Institute, revealed that attitudes of high schools, colleges, and engineering employers deter efforts to train more engineers. Students and recent graduates complain of poor preparation for engineering colleges, inadequate instruction in college, inaccurate information for choosing employers, and little recognition from employers.

Small business needs versatile engineers, said J. C. Beckett, Wesix Electric Heater Co. A reputation for working freedom and encouragement to participate in professional and community functions helps attract the right men.

In the utility field, projects in operating economics are suitable for assignment to graduate students, suggested W. R. Johnson, Pacific G&E Co. But utilities must recognize engineers with advanced training and provide opportunities for them to advance in management or technical activities commensurate with those in other industries.

Questions from the floor disclosed concern that salaries for men with 10 to 15 years experience do not make engineering attractive to high school boys. It was proposed, also, that employers show more interest in guiding engineers in their personal development for advancement.

The session on ethics brought more self-examination. The consulting engineer's aim is to promote the truth, to build good will and better friendships, and to be of benefit to all concerned, summarized H. J. Brunnier. The profession will be judged by the action of engineers, he said. Among the actions Brunnier condemned was competitive bidding for engineering projects. And here he found an adversary in E. C. Starr, Bonneville Power Administration, who advocated soliciting bids from competent engineering firms for service to government agencies. Votes from the audience showed 69% approval of this practice.

New Northwest Transmission Will Be 230 Kv

- **But one 345-kv 288-mile line supplies Portland**
- **Distribution transformer loading revised for economy**
- **Propose switched capacitors for 99.1% distribution pf**

Transmission for the 1,446 Mw to be added to Northwest Power Pool by Pacific Northwest Power Co's Mountain Sheep and Pleasant Valley hydro stations on the Snake River will be at 230 kv except for one 345-kv line to Portland. Basic reason, reported W. A. Morgan, G. R. George, R. C. Guse, and M. F. Hatch of Washington Water Power Co, is that power must flow in four directions with magnitudes below the 450-Mw-100-mile conditions at which 345 kv becomes economical.

Only the 288-mile Portland line provides the power flow and distance to justify the higher voltage, said the authors. Bundling two 795 MCM ACSR conductors boosts its capability by 50 Mw for a fourth of the cost of series capacitors (EW, July 9, p 84).

Design modifications in 205-mile Big Bend-Granite Falls, 230-kv double-circuit line have saved about 25%, said T. M. Austin, Bureau of Reclamation. These modifications include:

1. Adopting 1,320-ft ruling span to keep towers out of fields.

2. Using single ½-in. steel shield wire and cutting suspension strings to 14 insulators instead of 16.

3. Stressing 954 MCM ACSR at 13,000 instead of 12,000 lb for heavy ice and wind loading.

4. Designing suspension towers to hold two broken conductors at −40 F.

A new approach to calculating the lightning performance of transmission lines offers promise of explaining the high flashover rate of several recent lines, said C. F. Wagner, Westinghouse Electric Corp. Two cases cited were 330-kv Ohio Valley Electric Corp lines with 8.2 flashovers per 100 mi per year vs 0.5 predicted and 138-kv Commonwealth Edison Co lines with 24 flashovers per 100 mi per year vs 2.1 predicted. The only unusual features of these lines are great tower height and single ground wire.

The new approach evaluates motion of charges within the lightning stroke channel and current fed into the tower top in a manner which takes account of tower impedance. This concept is more in keeping with present knowledge of lightning and completely different from earlier assumptions that the stroke path has infinite surge impedance, Wagner said.

Tests on the 60-mile 220-kv Mettlen-Lavorgo transmission system in the Swiss Alps, reported by F. Schaer, Aare-Tessin Electricity Co, Ltd, and P. Baltensperger, Brown Boveri & Co, Ltd, disclose that residual charging current sustains current flow in a line-to-ground fault after single-phase breakers clear the faulted phase. Dead time of 0.4 to 0.46 sec proved sufficient to deionize the arc path. Maintenance of power flow over the two unaffected phases permitted such delay in reclosure without risking system instability. Additional tests on 2 and 3-phase faults disclosed that the dead time can be cut to about 0.2 sec.

Relay protection is of the high-speed distance type for 85% of the line and carrier transfer tripping for the remaining 15%. Clearing time in either case is about 0.1 sec. The carrier system proved to be unaffected by faults on an adjacent line.

Line tripping by carrier transfer has proved successful on Bonneville Power Administration's Grand Coulee-Olympia 287-kv line, reported A. W. Adams. This line includes autotransformers to the 230-kv bus at each end and protection includes differential relays for these transformers as well as line relays. Tests demonstrated fault clearing in 5-6 cycles through phase-to-ground arcing and solid faults on the line and for a transformer differential indication. Other applications on lines up to 345 kv are contemplated, he said.

Transistors can make carrier systems smaller and more reliable with less maintenance than has been required for conventional vacuum tube equipment, asserted W. C. Feaster, Potomac Edison Co, and E. E. Scheneman, Westinghouse Electric Corp. Theory and laboratory tests indicate that transistors and crystal diodes can be combined to make reliable and compact distance relays for line protection, said F. R. Bergseth, University of Washington.

Most economical loading of a distribution transformer serving summer irrigation pumping is with peaks at about 95% of nameplate rating, said

Arthur Klopfenstein, Southern California Edison Co. Residential area transformers near the coast have winter evening peaks and show minimum cost when peaks go to 110%. Costs included were ad valorem and income taxes, insurance, and interest and depreciation based on expected life for insulation heating corresponding to the load cycle. Aging was computed from data compiled in 1934 by L. C. Nichols. As better information becomes available about insulation aging, loading should be revised, he said.

Correction of distribution system power factor to 99.1% is economically justified on the Pacific G&E system, said T. A. Bettersworth. Savings in incremental energy loss alone would justify 94.3%, and savings in generating and bulk transmission capacity boost it to the higher figure. The additional vars will be supplied by switched pole-top capacitors.

Alternative var supply would have been generators and synchronous condensers, said Bettersworth. Generation already was at substantially unity power factor with vars supplied by synchronous condensers on subtransmission and static condensers on distribution. Cost of this alternative was taken as the additional losses from carrying the vars in subtransmission and distribution to feeder load centers, valued at $27 per kw on system peak and 2.8 mills per kwhr.

A protective gap has been developed for limiting voltage across a capacitor in series with the primary of a distribution transformer, reported L. W. Robbins, General Electric Co, in a paper prepared jointly with G. G. Auer and N. M. Neagle. Tests have demonstrated its ability to hold voltage on the 240-v 10-kvar capacitor used with a 2,400-v 50-kva distribution transformer to four times normal peak voltage during a secondary fault.

With this gap a series capacitor in the transformer primary provides an economical solution for voltage flicker from large single-phase motors, concluded the authors. Selecting the capacitor to give 5% impedance at transformer rating practically cancels transformer regulation and avoids sustained ferro resonance.

Voltage dips are measured with less than 0.1-v error on a 120-v source, using a recorder described by V. H. Kraybill, Commonwealth Edison Co, and H. M. Jensen, Penn State University. Key to its operation is a combination of two bridge circuits. The first of these is comprised of four identical lamps in two series circuits heated by the ac input. The output of this ac bridge forms one arm of a dc bridge. Resistance changes in the lamps unbalance the dc bridge to produce a pulse.

Suspending 500-kva network transformers from supports set in manhole walls cuts audible noise 4.5 to 11.5 Db, reported C. P. Xenis, Consolidated Edison Co.

Successful and permanent joining of aluminum to copper conductors in natural, corrosive atmosphere is practicable, said E. W. Greenfield, Kaiser Aluminum & Chemical Corp, along with A. H. Selker.

Solution has been found, they claimed, in copper and aluminum cups flash or pressure welded together to elminate brittle inter-metallic compounds. Removing flash from the weld leaves the shortest boundary, which is then sealed with thermosetting compound. This connector is compressed onto the copper and aluminum conductors.

Jointing Aluminum Cable Is Topic

Jointing techniques are the key to use of aluminum sheaths on aerial cables, said E. J. Merrell, Phelps Dodge Copper Products Corp, in a paper prepared jointly with R. A. Russbach. Solution of this problem permits cable pressures of 100 to 200 psig and clears the way for pressure-type cables taking advantage of the high hoop strength of aluminum.

The authors reported success with:

1. Wiping with solder at 290C over tin-zinc-lead tinning, with care to avoid contamination with aluminum.

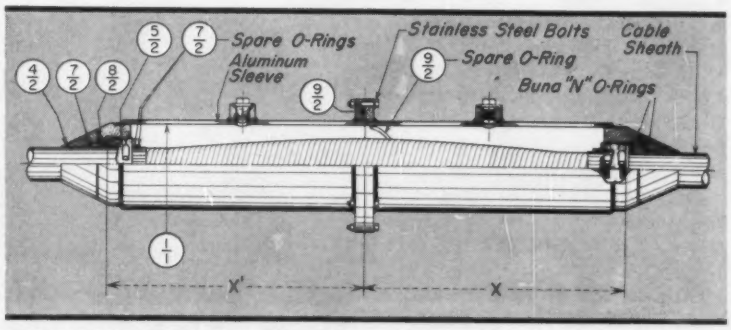
2. Welding aluminum bells to flared aluminum sheaths, using care to avoid contamination by cable oil, then welding sleeve to bells.

3. Installing gasketted rings on cable sheath, threading two-part flanged sleeve to the rings, and bolting flanges together on a Buna-N gasket.

Discussion by C. T. Hatcher, Consolidated Edison Co, revealed that all three jointing methods have been used in two experimental cable installations.

Welded joints were used on a 2-mile 23-kv aluminum-sheathed cable supplying distribution substations in Buffalo, according to a paper by C. T. Nicholson and G. P. Adams of Niagara Mohawk Power Corp. The relatively light weight and stiffness enabled spacing stainless steel supporting straps 15 ft apart.

Silicone-rubber-coated glass tape built up to 250 mils has been applied to insulate 13-kv 2,500-MCM cable at Consolidated Edison Co's Hell Gate Generating Station where varnished cambric was deteriorating from overload, reported A. R. Lee, General Electric Co, in a paper prepared jointly with C. T. Hatcher, Con Ed. Satisfactory operation proves that such cable will be reliable at 125C for at least 15 kv. Excellent electrical stability with low power factor and dielectric constant assures low dielectric loss. Cable of this type permits generating capacity increases where space is not available for additional cables, they concluded.



MECHANICAL SPLICE eliminates welding for aluminum-sheath cable joint

Study 2-Step Cut in Substation BIL

- Switching surges a problem, oil preservation okay
- New arrester standard criticized for testing difficulties
- Insulators washed "hot" with hydrant water and "gun"

Switching surges and 60-cps stresses require investigation now that lightning arresters can protect substation apparatus with reduced impulse strength, said P. L. Bellaschi, consultant. If today's requirements for full-wave, chopped-wave, and front-of-wave tests are retained, impulse levels could be reduced to 1,050 BIL from 1,175 for 345 kv, to 750 BIL from 825 for 230 kv, and to 450 BIL from 550 for 138 kv, he said. But these reduced BIL's would require that switching surges be held to 2.25-2.4 times normal line-to-neutral voltage. Until switching surges and other stresses have been more thoroughly investigated, he concluded, a general reduction of insulation by two BIL steps is not advisable.

Protection of a transformer against continuous voltage stress is complicated somewhat by its insulation system design, said W. C. Farneth and F. J. Vogel, Allis-Chalmers Mfg. Co. Insulation designed to prevent corona prior to flashover can withstand 90% of its one-minute 60-cps test value continuously. Switching-surge strength would be at least 1.25 times the one minute strength, they predicted, and it would not be affected seriously by wave shape or duration up to several tenths of a second.

A new assembly of insulation designed to suppress corona at voltages up to breakdown withstands high continuous and impulse voltages, said E. J. Adolphson and F. J. Vogel, Allis-Chalmers. Combining these assemblies with modern lightning arresters saves about 10% by permitting use of 161-kv-class transformers instead of 180-kv for 230-kv systems. Arresters 200 ft away protect against lightning and hold switching surges well below the transformer insulation strength.

Degradation of transformer oil in service will not preclude cutting insulation by 2 BIL steps, asserted W. J. Degnan, General Electric Co, in a joint paper with E. J. Shimanski. A recent survey of 71 power transformers with service up to 17 years showed consistent maintenance of desirable oil characteristics. Preservation methods in these units included conservators, gas-oil seals, and automatic gas seals. In no case had the oil been reclaimed, and filtering had been applied to only six units. Every sample exceeded 22 kv on ASTM dielectric test, and 95% exceeded 30 kv.

In discussion, Lynn Wetherill, General Electric Co, suggested that the new rounded-edge test gap might simulate more accurately the stress on oil in new transformers. And F. J. Vogel, Allis-Chalmers Co, questioned the ability of oil tests to detect moisture in insulation.

A new lightning arrester standard was presented by H. R. Armstrong, Detroit Edison Co; F. M. Defandorf, National Bureau of Standards; and A. M. Opsahl, Westinghouse Electric Corp. The standard sets forth acceptable testing practices.

Discussions presented by Line Material, Westinghouse, and Ohio Brass brought out these points: Specifications for transient recovery voltage ignore some conditions that cannot be eliminated in laboratory testing. Specifications are based on oversimplifications and eventually will have to be revised. The severe requirement of 100% rated voltage during power follow, with 10% higher voltage allowed during open circuit, may call for more testing because arresters must clear under these conditions in laboratories lacking stiff power circuits.

Exception was taken to the standard's premise that the 10 x 20 wave is essentially equal to the 12 x 45 wave which routine testing has found to be more severe.

If you can determine all the factors attending arrester application, then arrester margin can be reduced to zero. This guiding philosophy was put forward by H. R. Armstrong, Detroit Edison, for the application of lightning arresters on a large power system. For the general case he stated that after evaluation of all factors and complete analysis of maximum voltage to be found at the protective equipment, serious consideration should be given to use of not more than 10% margin.

E. Beck and A. M. Opsahl, Westinghouse, opposed the author's view on protecting dry-type transformers. G. F. Lincks, General Electric Co, cautioned that Armstrong's philosophy should be used carefully on systems having different conditions, particularly switching surges.

WASHING GUN for substation insulation is described to C. L. Collins, Los Angeles Dept of Water and Power, by R. S. Melville, Southern California Edison

Two papers describing equipment and practices used in washing substation insulators were received with considerable interest. C. L. Collins and H. J. H. Rutter said Los Angeles Dept of Water & Power uses water directly from city hydrants. R. S. Melville reported that Southern California Edison Co uses mobile washing equipment and a water "gun". Both papers pointed out that water washing must be backed up by manual cleaning of certain equipment and for stubborn contamination problems.

Impulse testing is not harmful to transformer cores beyond increasing core loss by less than 2%, reported J. H. McWhirter, T. R. Specht, and W. D. Albright, all of Westinghouse. There are no hidden dangers, the authors said, and a transformer impulse-tested at the factory will show no greater loss in the field. Increase in iron loss after impulse-testing is caused by a breakdown of interlaminal insulation which may permit loss-producing eddy currents in the core.

Testing of a 230-kv gas-blast switch, reported P. E. Richardson, Bureau of Reclamation, and Arem Foti, I-T-E Circuit Breaker, brought these results: Successful interruption of transformer magnetizing current from a 112,500-kva bank, dropping of up to 84 miles of 230-kv line, gas blast reduces arc length and reach.

Establish Parameters for Load Control

- **Best bias setting matches governing characteristic**
- **Tie-line control, de-centralized computer, give economy**
- **Digital computer solves system power flow fast**

Tie line bias control has become the accepted method of regulating most interconnected power systems, said Nathan Cohn, Leeds & Northrup Co. But the size of today's systems and their concentrations of generation and load call for a new analysis of bias settings. Cohn's conclusions were:

1. Settings which match a system's natural governing response impose no further change on frequency, tie-line power flow, or local generation for a load change in a remote area of the interconnection.

2. Settings lower than the natural characteristic impose a relatively greater change on frequency, tie-line flow, and local generation than do higher settings.

3. Settings different than the natural characteristic impose relatively large changes on system frequency.

4. Settings in the range of half to double the natural characteristic cause little change in tie-line contribution.

5. Settings different from the natural characteristic cause changes in local generation which reflect the load component of the natural characteristic and the amount of local generation without bias control.

Discussion revealed general agreement that bias settings should match system governing characteristic. But the difficulty in this approach is that this characteristic varies with system load and generating capacity.

Economic dispatch of interconnected systems could be accomplished automatically by use of a centralized computer controlling the entire pool. The alternate would be computers in each of the systems in the pool which evaluate tie-line conditions in dispatching generation under their control. The latter method, said L. K. Kirchmayer in a paper prepared jointly with H. H. Chamberlain and A. F. Glimn, all General Electric Co, requires fewer telemetering channels and smaller computers. It also permits more accurate consideration of line losses.

An automatic dispatching system reflecting this philosophy has been installed by Kansas City P&L Co. According to K. N. Burnett, D. W. Halfhill, and B. R. Shepard, all General Electric Co, this installation proves that operation can be almost fully automatic on most power systems. Exception is decisions to start or to shut down a machine.

Solution with a digital computer of simultaneous equations for power flow gives the economic dispatch of a 10-bus system in 60 sec, reported R. B. Shipley and Martin Hochdorf, TVA. The method starts with system impedances and incremental generating costs and evaluates individual loads, power factors, and voltages in printing economical output of kw and kvar.

J. S. MOULTON, convention chairman (center), hears from R. H. Miller (left) and E. F. Sixtus, chairmen of program and registration, attendance exceeds 2,000

Generator Start-Up System Simplified

- **Flexible cooling system gives independent H_2 heat control**
- **Tertiary of main transformer cuts station service cost**
- **Kemano's hydro turbines pick up full load in 3 seconds**

Among design changes for the third unit at Union Electric Co's Meramec Plant—a 287-Mva capability, cross-compound, axial-flow turbogenerator—are use of a 400-kw, flywheel-type mg set for exciting each main generator and provision for heating the hydrogen during rotor preheating. In presenting the paper, R. W. Gaskins said experience has showed that generator temperature swings widely while cooling oil is being maintained at the proper level prior to putting a machine on the line. Meramec 3 will overcome this with a flexible circulating water system which permits independent control of hydrogen and oil temperatures.

Comparing units 3 and 4 with the first two at Ohio Power Co's Muskingum River Plant, V. P. Rader and C. P. Zimmerman, AG&E Service Corp, included these comments. Availability of 13.2-kv power in the tertiaries of 150,000-kva, 300-132-kv autotransformers led to use of a 13.2-kv auxiliary system which is lower in cost and offers reduced voltage drop and load center transformation for 550-v auxiliaries. During normal operation, the single 13.2-kv bus is fed through a 15,000-kva 13.2-15.5-kv transformer on the high-pressure generator leads. Forced-draft blowers are powered by 4,000-hp motors, served through a 5,000-kva, 13.2-4-kv transformer.

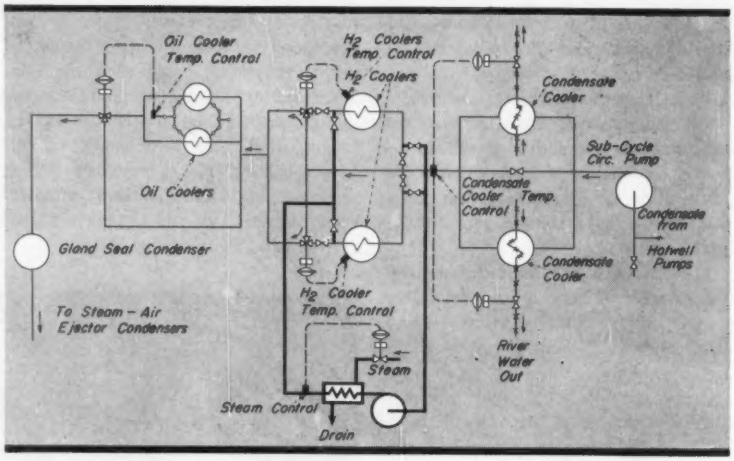
Comparison of indoor vs outdoor plants by Einar Nilsson, Pacific Gas & Electric Co and L. K. Del'Homme, Houston Lighting & Power Co, brought out these points in favor of outdoor plants: Savings of $9-10 per kw, greater accessibility, improved safety and fire conditions.

Exchange agreements between a utility and an industrial customer covering fuel and steam, which can bring low cost and better service, warrant serious management consideration, said W. C. Cauthern, C. F. Braun & Co. He described the conception of designing and building Delaware P&L Co's Delaware City steam plant and Tidewater Oil Co's Delaware Flying A refinery as one overall project. The plant will burn by-product fluid coke and supply electricity and steam.

Eight generating units totaling 1,330 Mw placed in service since 1951 or under construction by Southern California Edison Co have been standardized in construction and operation, said J. L. Cohon. With five of these units on the line, plus looping of the 220-kv system, Edison is abandoning use of auxiliary generators in favor of auxiliary transformers direct-connected to main generator leads.

Hydro turbines at Alcan's Kemano project can pick up full load within 3 sec, stated J. T. Madill and W. O. Codrington, Aluminum Co of Canada. This is achieved with deflectors in front of the needle valves. Generators at Kemano have six phase leads brought out to permit metering CT's on the neutral and split-phase protection on high tension leads.

Over a mile of head will be utilized by Pacific Gas & Electric Co to develop 296,000 kw from a 760 sec-ft flow through three plants on North Fork of Kings River, reported W. R. Johnson, D. P. Dinapoli, and J. B. Cook.



START-UP LOOP (heavy lines) permits steam heating of generator gas

Nuclear Power Progress Revealed for 4 Projects

Five papers in the nucleonics session presented progress reports on four different types of reactors designed for large-scale power production. C. H. Robbins and E. P. Peabody, General Electric Co, discussed the dual-cycle boiling water reactor for the 180-Mw Dresden Station (Nuclear Power Group, Inc). The reactor can be controlled through a 40-to-100% range of load with one setting of the control rods. Maximum safety will be enhanced by three factors: (1) Inherent "shut-down" characteristic of the reactor. (2) Injection of boric acid (boron) to make the reactor sub-critical. (3) Location of the reactor within a pressure-tight sphere.

Detection of iodine or rare fission gases (krypton and xenon) is a prom-

(*Continued on page* 194)

E. BRYSON SESSIONS,
Commercial Editor

STORE LIGHTING:

How You Can Sell More To a Changing Retail Market

The Situation:

- Competition between downtown stores and suburban shopping centers is getting hotter
- It's bringing search for new ways to move more goods faster
- Swing is to more self-service, better display
- Best selling climate ever — store owners more receptive
- Lighting kwhr sales per store could double in 10 years

To Sell More Store Lighting:

- Capitalize on this battle of retailers
- Put larger share of commercial revenues into sales
- Build tighter programs with contractors, shopping center managements
- Make the most of selling situations as they exist

Full report follows on next 15 pages

Battle for Dollars:

Downtown business section vs

What World War II did to upgrade industrial lighting a new kind of battle promises to do for lighting in stores.

It's the competitive scrap for more customers' dollars raging between downtown stores and the fast-rising, merchandising-smart, suburban shopping centers. And it's creating a climate which puts the utility in the best position to sell store lighting that it probably ever has known.

The urban storeowner, in the one corner, is seeing too many shopping dollars move out to the suburbs. He has problems:

- Lack of parking space.
- Inconvenient transportation for the customer.
- Outmoded equipment that restricts selling, traffic.
- Unrealistic store hours.

Meanwhile, shopping centers have not yet reached peak development. An estimated 1,000 have been built, and at least 2,000 more are in the planning stage. The continued flight of families to the suburbs plus industrial decentralization promises their ascending importance in retailing.

Accompanying this battle for the bulging wallet, is an upheaval in retailing methods. Today's merchant is going to mass merchandising, automatized selling, and more reliance on self-service. He's relying more and more on physical devices and less on personal salesmanship to motivate the buyer and make the sale. "Self-service in the future," says marketing expert E. B. Weiss, "will extend to practically all categories of merchandise." And it's an old marketing fact that 85% of buying impressions are made through eyesight.

"The retailer is being forced to revamp his traditional selling ways," declares a leading retailing executive. "More than ever before he's lending a receptive ear to new merchandising ideas—he must if he's to survive." Adds a power company sales chief, "If we can't sell store lighting in this situation, we never will."

Shopping Centers Most Alert

So far shopping centers have been the most awake to good lighting's sales-getting strength. This has been largely due to chain stores which dominate most centers. Chains usually have their own designing staffs and better control of the lighting that goes in. Also lighting salesmen can get to them easier; fewer contacts can sell a larger number of stores.

But lighting in shopping centers still is not so good as it would seem, particularly among the smaller, individually operated stores. A study in Cleveland showed many of the seemingly ultra-ultra shopping centers there had lighting levels of only 30 ft-c.

The utility has a good selling advantage with shopping centers, however. Because it must provide service, it usually knows well in advance that a shopping center is going up.

suburban shopping center

This gives it an early opportunity to get in with a lighting presentation. Most shopping center managements get a percentage of tenant's sales as part of the lease agreement (5% to 6% says Chain Store Age). Others establish a minimum rent per sq ft. All are interested in anything that will improve sales.

Meanwhile, it's the downtown stores, notably the small owner-operated ones who so far are the underdogs in this fight—and it's apparently a lot of their own doing. Department Store Executive Raymond C. Kramer blames "obsolete management," not the rise of suburban shopping centers for the closing of three New York department stores. Buildings generally are old. Lightingwise, many still are trying to get by with indirect units a la the 1930's, some even with still older frosted globes. "My place was like a Pierce Arrow once, and I guess it's still a Pierce Arrow now," sadly admits one downtown retailer. Planning experts see a general urban overhaul necessary—modernization of the entire downtown area, better street lighting, improved traffic conditions.

The utility, though more familiar with selling to downtown stores, doesn't have the advantage of a "package deal" that comes so often with shopping centers. Prospects are more numerous and jobs are smaller. Usually it's a remodeling job instead of a start. This means a triple sales task: first selling the need to modernize, then selling the lighting, and finally keeping it sold.

There are some 2.5 million retail stores and service establishments in the U. S. Only 15% of them or 375,000 have the lighting they need, according to a National Lighting Bureau study. Yet effective store lighting can boost a retailer's sales by 20% reports the Illuminating Engineering Society. And the cost of getting it can be limited to only one-half of one percent of his gross revenues. One drug store proprietor says his sales jumped 40% with a new lighting job (page 140). A Georgia auto supply dealer reports a 25% increase. "Store lighting," states Chain Store Age, "is now definitely viewed by chain retailers as a selling tool instead of merely a necessary device for illumination."

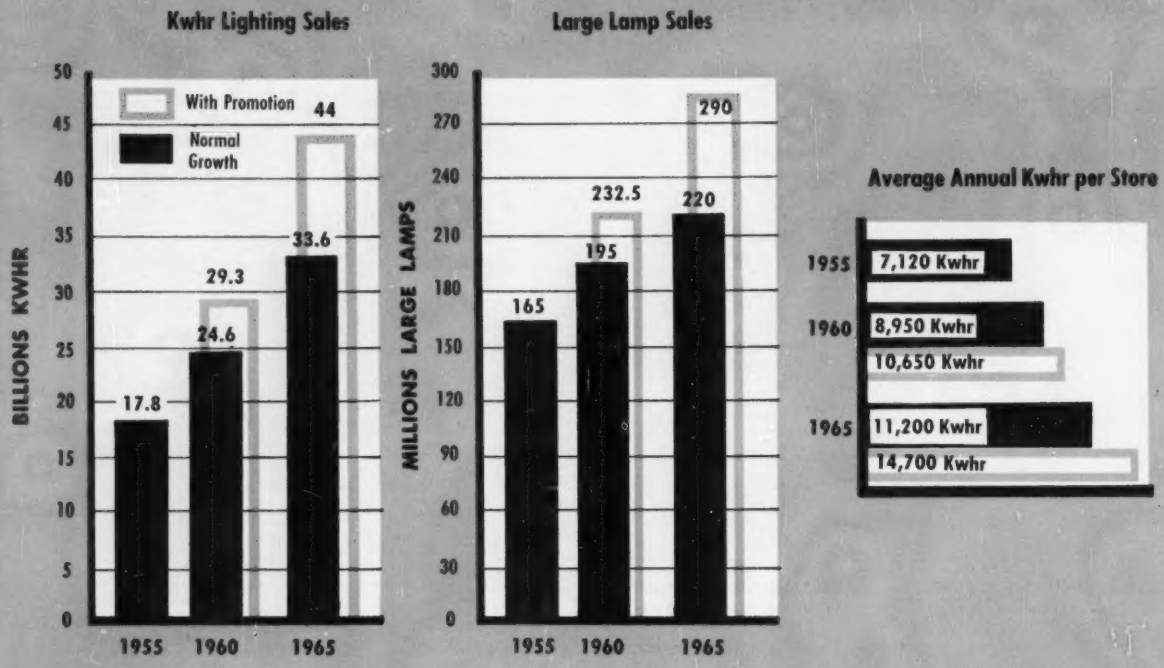
Best Sales Bets

Lamp and fixture manufacturers see the biggest store lighting sales opportunities in these directions:

- Lighting of display and selling zones, particularly in the smaller owner-operated stores.
- Better window lighting with swing to open-front store design and need to eliminate daytime window reflections.
- More sign and outdoor lighting as downtown sections rehabilitate and new shopping centers go up.

For a statistical look at how store lighting sales are expected to perform over the next ten years, turn the page.

How Store Lighting Could Grow



EW Estimates...Based on industry forecasts published in Electrical World July 25, 1955

At today's selling tempo, the average store five years from now will be using about 1,800 more kwhr annually for lighting purposes than it does now, a gain of 25.7%. Ten years from now it could be about 4,000 kwhr more or an increase of 57.3%.

Some promotional exertion on the other hand could change the picture considerably. Promotable growth, based on projected figures for all industry lighting sales (EW, July 25, 1955, p 92), shows lighting use per store jumping 49.6% by 1960, a full 106.5% by 1965. The 14,700 kwhr consumed ten years from now would be more than double what is used today after 76 years of selling.

In light of retailing's heightened intramural fight for business (previous page) increases in store lighting promotion could well be justified. Chain Store Age says more than $1.2 billion will be spent this year by chains alone for new building and remodeling.

Lighting's share of remodeling varies according to the kind of job planned. But it is generally accepted that about 10% of stores undergo some kind of renovation each year. If each of these stores added but 1 kw in new lighting in the process, it could mean 250,000 kw additional load and consumption upwards of three-quarter billion kwhr per year.

Added to this would be new stores and service outlets, as many as 500,000 in ten years if the present rate continues. Lighting experts say a lighting job typically gets about 4 or 5% of the total construction cost, as much as 10% when it's a good one. If lighted to levels common today (about 3 to 3.5 kw per average store), they will put some 175,000 new kw on utility lines. With some selling this figure could easily increase two or three times.

5 TIMES MORE LIGHT NEEDED

	Well-Lighted Store	Average Store
Foot-Candle Level Per Sq. Ft.	100	20
Watts per Sq. Ft.	5	1
Kw Load (Store of 1,500 Sq. Ft.)	7.5	1.5

Figures based on manufacturers' estimates — does not include display, window and outdoor sign lighting.

Too Little Money, Too Few Men

The market for store lighting is there, but utility manpower and promotional money seemingly isn't.

This at least is what shows up in a survey of 34 utilities's commercial sales activities made earlier this year by Ebasco Services, Inc.

"Before World War II in 1940, utilities were doing a pretty good selling job in the commercial field," says Ebasco's W. L. Byrne, who handled the study. "These 34 companies were spending 1.9% of their commercial revenues on sales—about $3.43 per commercial customer. They had an average of one field contact man for every 1,370 customers or 7.3 salesmen per 10,000 customers. This was enough so that most of them could make at least one call a year on each customer."

Selling Not What It Was

In 1955 Byrne found it was quite another story. While selling opportunities in the commercial field have expanded greatly since prewar days, today's selling effort on the whole doesn't measure up—even with 1940. Average sales expenditure has dropped from 1.9% to 1.5% (see chart at right). And even though these utilities have added more sales personnel since that time, the number of customers to be serviced has gone up faster—about 42% more now than in 1940. So now there is only one salesman for every 1,669 customers or six men per 10,000 customers. Ratio of supervisors and clerks to salesmen remains about the same—one office person for each four men in the field.

Money spent per customer has increased—from $3.43 then to $5.74 now. But, points out Byrne, the dollar spent today will buy only about 50% of what it would in 1940. To do the same job as they did prewar, these utilities should be spending $6.86.

Hardest hit by the cuts has been lighting. While most other commercial services now get a larger share of the sales promotion budget (notably commercial cooking), lighting actually gets less. In 1940 it got a 62% cut, today 51% (see chart). In other words commercial lighting promotion now gets a smaller share of a still smaller budget than it did 16 years ago.

Byrne feels his survey is a fairly good indication of what is going on in the industry. The 34 utilities queried serve nearly 21% of total meters and are in 26 states.

How to rectify the situation? If these utilities were to double their present ad budgets for commercial services, it would bring total sales expenses only to 1.7% of class revenues, says Byrne. And to attain the same customer coverage as they apparently considered necessary and justifiable in 1940 would mean only about 10% more men, on the average. Altogether this expanded sales budget still would raise the total sales expense only to the 1.9% average of 1940.

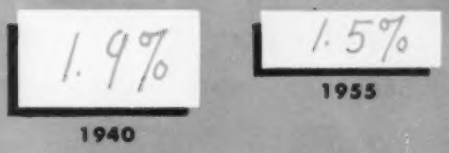
Concludes Byrne: "Good lighting has to be sold. And until some magic formula is found—whereby the customers themselves will demand good lighting or the distributors and electrical contractors can be persuaded to do the kind of selling job needed—the utility will have to provide the leadership and promotional effort."

COMMERCIAL PROMOTION IS NOT KEEPING UP

(Based on Survey of 34 Utilities)

EXPENDITURES:

(% of commercial revenues spent on sales)

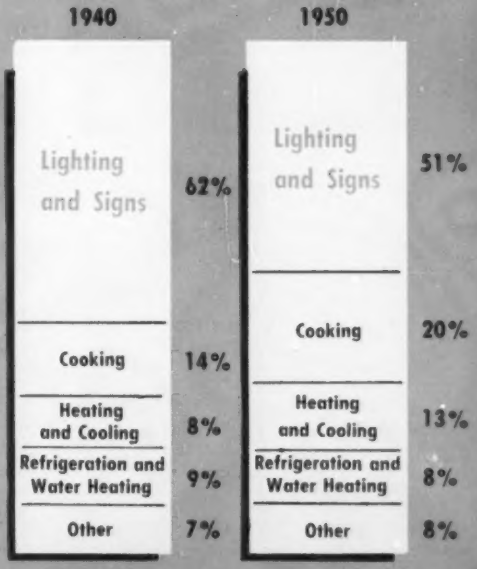


MANPOWER:

(per 10,000 customers)

Source: Ebasco Services, Inc.

HOW COMMERCIAL PROMOTION IS DIVIDED



(Based on Survey of 34 Utilities)

Source: Ebasco Services, Inc.

Store Lighting's "Breakthrough":

More Uses and More Kwhr

- Salesmanship will be hard put to keep up with opportunities that open; market growth will be vertical
- For shopping centers, lighted landscaping, open bazaars
- For urban stores, some catching up to do through overall modernization; new interest in display

50 YEARS AGO

25 YEARS AGO

TODAY

Few fields for lighting have had the explosion of new and diverse uses and applications as has store lighting in recent years. A look at the pictures on the left testify to this.

The very characteristics of the store and its functions make it fertile ground to put lighting to use: For general illumination, for display, for signs and advertising, for glamor, for parking. In short, as one lamp maker puts it, "for attraction, appraisal, and atmosphere."

Lighting for the store of today can range from a single two-lamp fixture and a sign reading "Eats" to a fully integrated lighting package like the store in Ohio diagrammed at right. And as manufacturers continue to come up with new applications, the sales opportunities will expand accordingly.

The problem most likely will be to keep the selling efforts up with the technological developments—and to capitalize on the favorable changes taking place in the retail market. Here are some of the store lighting opportunities which already exist or are on their way:

For Shopping Centers:

- Location off main traffic arteries, more entrances, exits, and parking space will mean need for more street lighting within the center area.
- "Bazaar" effect popular in new center designs will bring wider use of glass, open-front designs—an expanded market for more window lighting and higher level interior illumination.
- Greater emphasis on landscaping and park-like atmosphere complete with walks and malls—a natural for dramatic outdoor lighting.
- Increasing night openings prompt bigger and better pylons, signs, and other lighting to grab attention.

For downtown stores:

- More self-service will bring more featured merchandise displays—stimulate use of spot and emphasis lighting.
- Retailer's desire to build deeper traffic penetration spells greater use of display lighting in back parts of store.
- As self-service puts more reliance on customer's own buying discernment, higher levels of general illumination will be needed.
- Store modernization and use of more glass areas, as in shopping centers, will spur new interest in window and sign lighting.
- To draw families from home, eating places will go even heavier for atmosphere, will open door for more mood and decorative lighting.
- As side effect, overall urban rehabilitation can speed street lighting.

While the shopping center boom is expected to continue and stores could increase at a 50,000 a year rate, most growth in store lighting is expected to be "vertical" rather than "horizontal." That is, most sales will be made within the existing market. Lighting engineers say the model store at right in future years will have twice its present lighting. And as good as it appears now, it still is niggardly in general area illumination. It could well be double what it is. However, it's shown here as a good representative of what can and is being sold currently

in small stores throughout the country.

Adding to this vertical growth will be use of the lighting equipment for more hours of the day, particularly display and window lighting. But it will take some selling to do it. Utilities have found many stores don't make use of their lighting as they should—even after they buy and install a new job. One pitch that has been found to work: The store owner's power use most times puts him at the low end of the rate scale. Thus he gets his kwhr for the added hours of lighting at "discount" rates.

Still basic to store lighting's whole selling approach appears to be the "sales weapon" concept, ie, that it is every bit as important to merchandising as a mannequin in a show window or an ad in a newspaper. And there's every indication that retailers are becoming more aware of it. Fewer returns of merchandise have been noted when shoppers can see what they are buying. The way lighting can cut through the drab "mirror" effects of daytime window reflection in store windows is getting wider recognition. So is its ability to build impulse sales.

Consolidated Edison Co of New York cites a survey which found 62% of shoppers buy things they didn't originally intend to buy. Of these it was found 75% did so because of spotlighted displays. (Another noteworthy fact: Six out of ten of these impulse buyers were women.)

Same Old Problems

Rosy as the atmosphere appears, however, the utility salesman still will have some familiar selling problems to face. In shopping centers the key will be to reach the developer and his architect early enough to present his story and aid in the planning. In urban areas the key will be to get the smaller dealer to recognize the need to improve his competitive position, and then hound him into action.

The shopping center tenant usually has little to say about his lighting. It's left up to the center management. "And his idea of what is good lighting may be a couple of bare fluorescent tubes," says a lamp manufacturing executive. "Or the management may make an allowance of a half dozen or so outlets and then leave it to the tenant to buy lighting."

How some utilities are approaching their sales problems, and the results they are getting is shown on the pages that follow.

Can You Spot a 16 Kw Load Here?

The store diagrammed below is only slightly more than 1,500 sq ft. Yet it has a 16 kw lighting load (exclusive of outdoor sign) — nearly five times that of the average store of the same size.

General Lighting

66 fluorescent lamps (40 w each)

Total — 3,080 watts (including ballast loss)

Spot Lighting

24 spotlights (150 w each)

Total — 3,600 watts

Show Case Lighting

29 fluorescents (40 w each)
16 fluorescents (20 w each)
13 fluorescents (15 w each)

Total — 2,292 watts (including ballast loss)

Total Store Interior — 8.97 Kw

Total Annual Use—26,910 Kwhr

Window and Entrance Lighting — 7.05 Kw
(47 spots and downlights at 150 w each)

Total Annual Use—29,610 Kwhr

Figures based on 3,000 hr annual use in interior; 4,200 hr annual use in window and entrance.

STORE LIGHTING

Utilities Aim Lighting Promotion

- Store lighting brings eager response from downtown storekeepers
- Chambers of Commerce join in to promote brighter, more modern business establishments
- These low-pressure campaigns are adding up to sizable revenue increases for utilities

Ohio Power Co calls it "Operation Main Street." Connecticut Light & Power Co calls it "The Look That Sells." Western Massachusetts Electric Co calls it "Store Modernization Program."

By any title the downtown store lighting promotion programs of these three companies are bringing highly satisfactory results. Although the returns are incomplete, each company is able to show revenue increases running into thousands of dollars. Favorable local publicity has resulted in just about every town where promotion has been undertaken. And, perhaps even more important, these store lighting and modernization programs bring with them a new glow of civic pride that encourages still more modernization.

Although each of the companies has tailored its promotion to the localities it serves, the methods and pattern are very similar. In general, it is low-pressure promotion built into these three steps: planning, meeting or conference, and follow-up.

To get the most out of a campaign, careful, and thorough planning is a must. Center of each of these programs is a dinner or social meeting where the utility and its trade allies can demonstrate the benefits of modern store lighting. Usually a Chamber of Commerce or civic club will sponsor such a meeting and invite local business men. The utility helps by preparing invitations, printing tickets, and advertising and publicizing the event.

Lighting and modernization demonstrations are planned and rehearsed usually in cooperation with lamp manufacturers and store designers. These must be carefully timed if they are to be kept within the bounds of a crowded evening. The utility usually coordinates these demonstrations, and it must keep all interested parties informed during the planning stage.

Following dinner or a social hour, lighting and modernization demonstrations are presented, sometimes preceded by a welcoming speech by a local dignitary. A sample program presented by Western Massachusetts Electric Co followed along these lines, themed under the title, "Modernizing For Profit:"

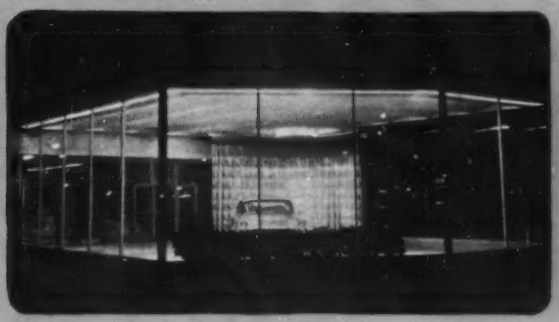
1. "Make Selling Easier with Good Lighting"—demonstration by the representative of a lamp manufacturer.
2. "Plan Modernization for Profit"—speech by a well-known local architect.
3. "Financing Store Modernization"—presentation by a bank vice president.
4. Panel discussion on modernization and renovation led by utility lighting engineer.

Audiences range from 25 to more than 100 men and women representing all walks of business. At the end the audience may be given cards on which they can indicate their specific areas of interest such as store front lighting, window lighting, interior lighting, or showcase lighting. They may also be given brochures covering several phases of the lighting and modernization demonstrations. Ohio Power Co shows a specially-tailored colored slide film presentation to its audiences. Samples are shown in the panel at top of this spread.

Following one of the Ohio Power presentations, 12 of 60 merchants attending asked for new lighting layouts. This sort of response has come in varying degrees at other presentations. But even where the response is immediate, appropriately timed follow-ups are vital to the success of these campaigns.

These may be in the form of letters, either individually or form written. Prospects are thanked for attendance and given further information as to contacts, plans, and equip-

at Main Street Merchants



ment for their lighting or other modernization needs. Information from the check cards is routed to utility lighting specialists or to the other trade allies that cooperated in putting on the presentation. From these leads personal calls are arranged.

Connecticut L&P has prepared a special form for its sales department to report these follow-up calls. This form is used to obtain information on all renovation and modernization steps taken by the prospect. The sales representative is also asked to estimate the additional power demand which will result from these improvements.

From this data the utility is able to put together a fairly comprehensive picture of the results of its promotion campaigns. Information on the form will also indicate whether additional follow-up calls are necessary.

Western Massachusetts reports that one of its divisions increased load by 170 kw as a direct result of the store modernization program. The company figures this increased demand represents an annual revenue gain of $14,000, or $70,000 for the five years which it calculates is the minimum span of a store lighting installation. Results in other divisions have been less spectacular but satisfactory.

Ohio Power says its "Operation Main Street" campaign added 75 kw of store lighting in Cambridge, Ohio, alone. This will bring a $3,000-increase in annual revenue. Other jobs in the planning stage in this one town will add 75 kw of lighting and 125 kw of air conditioning.

Connecticut L&P's "Look That Sells Program," started just last year, has added load estimated at 93.75 kw, which will increase annual revenue by $4,800. (Details in box below.)

Key Steps in Connecticut L&P's "Look That Sells" Campaign

1. Planning

Eight meetings planned with retail merchants under Chamber of Commerce sponsorship. Demonstration program set up. Announcements and tickets furnished Chamber of Commerce for distribution. Meeting places designated. Company sales personnel informed of all arrangements.

2. Program

Social hour and dinner usually preceded the program. A short speech by a town dignitary was followed by a demonstration of interior and exterior store lighting. A store designer presented numerous modernization plans and ideas. A representative of Connecticut L&P discussed adequate wiring and the company's wiring and lighting finance plan. All speakers then answered questions and asked for a show of interest in modernization. Over 235 attended the eight meetings.

3. Response

Number of prospect contacts as a result of meetings — 70.
Number of prospects who will modernize — 37.
Of these, 27 will relight interiors.
14 will relight windows.
9 will install illuminated signs.
3 will install flood lighting.
Number of prospects who will renovate — 19.
Number of customers who will add major appliances — 2.
Increased annual revenue $4,800.

In addition the company received favorable publicity in a number of service area newspapers and a number of letters of thanks from sponsors and merchants.

LIGHT UP Your STORE WINDOWS
AFTER CLOSING HOURS
BY USE OF THIS PORTABLE TIME CLOCK .... CONTROLLED WINDOW LIGHTING SET
Simple Installation Do it Yourself In a Few Minutes
$21.95 Set
Special Offer

This window lighting kit . . . was sales "door opener" as . . .

"Light Up and Sell" Ups Night Load

JAMES F. FINN, Commercial Sales Division, Detroit Edison Co, Detroit, Mich.

A portable window lighting kit sold at a low price ($21.95) delivered double-barreled results to Detroit Edison during a recent three-month "Light Up and Sell" campaign.

First, it sold 1,100 kits to put 450 kw of new load into heretofore unlighted store windows. Second, as window lighting interest climbed, kwhr sales for interior store lighting followed. More than 3,000 kw of other lighting was gained over and above the 450 kw picked up by sale of the kits.

Detroit Edison had three reasons for basing its push on the inexpensive lighting package: **1.** It presented easily understood, versatile features that salesmen could quickly demonstrate in the store. **2.** It served as an excellent starting point in selling general store lighting. **3.** Detroit Edison's newer salesmen picked up valuable experience in having a tangible product to sell.

The window lighting kit consists of three 150-w flood lamps and holders, a portable timer, and a 9-ft extension cord with a three-way convenience outlet. It was sold by hardware and appliance dealers whose efforts were helped by 400 displays, pictured above, which Detroit Ed furnished and also set up in its 72 offices.

Half Had Lights Out

In a pre-promotion survey the utility's 82 representatives made nighttime rounds of their districts. Their findings: About half of a list of 39,000 customers kept their store lights off after closing. Names and addresses of the blacked-out stores were listed and then followed up by personal calls when the promotion got underway.

Salesmen centered their pitch around these points: Growing competition from dramatically lighted shopping centers, the need to flag interest of both pedestrians and motorists.

Not all the kits sold went for window lighting. Some merchants spotted them on merchandise behind their open-front glass doors (see picture). Others used them on displays in the rear of their stores to draw deeper traffic penetration. Some hardware and appliance dealers, new to lighting promotion, not only sold the kits but kept some for their own use.

The dealers also learned what Detroit Edison's commercial sales executives already knew about lighting sales: "When the merchant makes an investment in floor tile or show cases, it may be another five years before he can consider another capital investment. This means the electrical industry loses income from equipment, wiring, and electricity sales for five years because the competition got the sale. And that is where the lighting kit fit in. It helped make immediate sales which otherwise might have been a long time in coming.

For dealers who had extra window lighting packages, Detroit Edison followed up with advertising and promotion plugging their use in the home.

In Pittsburgh . . .

Cooperative Selling Gets $6 Million Results . . .

- Electric League's Planned Lighting Program does it in only four years
- Its secret: Getting everyone into the act with each promoting his special market
- Contests, plaques, financial help from participants build interest

Equipment	Number	Value
Fluorescent fixtures	78,601	$2,084,000
Incandescent fixtures	21,571	349,000
Fluorescent lamps	188,289	316,000
Incandescent & Mer lamps	27,135	41,100
Installation & Wiring costs	---	2,175,000
Utility	17,963 KW	823,000 EAR
Total Business		$5,788,100

In the Pittsburgh area Planned Lighting campaigns over four successive years have produced nearly $6 million worth of business (See table). While this area is a sizable one and highly industrialized, it is doubtful if the campaigns would have been so successful if it were not for cooperative promotion among industry allies.

Guiding the four compaigns was the Electric League of Western Pennsylvania. The league is made up of all elements of the electrical industry. It has stressed for years the industry's interdependence. It has argued successfully that the utility, the contractor, the wholesaler, the fixture manufacturer, and the lamp manufacturer cannot make progress alone. For example, what good is a lamp if no one makes a fixture for it, if the fixture isn't wired, or if no one can send energy through the wiring.

In Pittsburgh the league runs its Planned Lighting Sales Campaign every Oct. 1 to Jan. 31, training its guns on the store, office, school, and industrial lighting markets.

All Contribute Money

Invited to participate, along with the utility, are manufacturers, wholesalers, and contractors. Thus the league coordinates the promotional, engineering, and selling efforts of all branches of the local lighting industry. Participation is not limited to league members, and this policy has led many of those taking part ultimately to join the league.

Each participant contributes to a campaign fund. This is used to defray the expenses of a kick-off dinner, campaign prizes and cash awards.

During the campaign, a sales contest is held for wholesaler salesman. All jobs billed during the period of the campaign are eligible for this competition.

Jobs entered receive points according to a scale predicated on the quantity and quality values of illumination established by the IES. Each point has a monetary value which is determined by dividing the total points scored by the participants into the amount allotted for the awards. In last year's campaign the highest man was awarded $284.20. In all, $1,340 was awarded to 25 contestants in the wholesaler division.

There are two report periods—one ending Nov. 15, the other Jan. 31. Leaders at the end of each report period receive additional cash awards of $25, $15, and $10.

During the campaign, a contest is conducted for electrical contractors with equal prizes in each of four job classifications—light for selling . . . light for schools . . . light for production . . . light for atmosphere—with prizes of $75, $50, $25, and $15.

Bronze Plaques Awarded

One or many jobs completed between Jan. 1 of one year and Jan. 31 of the following year may be entered in the competition. Each installation is visited by a committee of judges who examine, compare, and evaluate the individual job.

At the end of the campaign a bronze plaque is awarded to the distributor organization doing the most outstanding job during the campaign. The winner is the wholesaler whose performance produces the largest number of merit points per registered sales representative.

A bronze plaque is awarded to the electrical contracting organization which accumulates the largest point total during the campaign period.

As a major contribution to the campaign, Duquesne Light Co releases approximately $10,000 of direct mail materials on store, office, school, and industrial lighting.

Participating manufacturers, distributors, and electrical contractors are encouraged to use direct mail advertising, too. They can mail this advertising, according to a schedule, using up-to-date mailing lists supplied by the utility. Participants furnish the mailing materials and postage; utility pays for addressing and other mechanics of mailing.

7 Ways to Increase Outdoor Lighting

Here are seven tested sales steps a utility can use to build sign and outdoor lighting sales. All of them were employed by Pennsylvania Electric Co and Metropolitan Edison Co in a recent six-week "Advertise with Light" campaign. The results: A total of 314 sales were made, representing 463 kw in signs and 1,128 kw in other outdoor lighting. Here are the seven steps to follow to equal their success:

1. Tie-in with allies: Furnish local sign dealers and representatives of outdoor lighting manufacturers with a complete outline of the program. Ask them to help by supplying sign sketches, slides, photos, and other demonstration materials. Have them pass along sales leads. Arrange a cooperative mailing. At Penelec and Meco the utility handled addressing and mailing for $4 per 100 pieces.

2. Build a prospect list: Have commercial and industrial representatives list all their prospects well ahead of the program.

3. Use direct mail: The two companies sent special letters with return postcards offering slides, sketches of signs, and lighting layout and rate information. Letters went to service stations and parking lots for floodlighting, stores of all classifications for signs and exterior lighting. Leads were turned over to cooperating allies.

4. Provide selling tools: Furnish sales representatives with portable display material and equipment. Penelec and Meco men took a reflector lamp assembly, 50-ft extension cord, folding standard to elevate reflectors, a pocket viewer with slides of attractive floodlighting, signs, and store fronts. Sketches of proposed signs were available from sign companies.

5. Conduct sales meetings: Gather sales representatives in principal cities for manufacturers' descriptions of equipment and sign features. Demonstrate sales materials and take time for practicing sales stories prepared from sample scripts and analysis forms on products and prospects.

6. Get the story told: Arrange for representatives to show and tell civic and social groups, merchant associations, and Chambers of Commerce what a brightened Main Street will mean in the way of added business, attractiveness, and safety. Penelec and Meco found that talks must be scheduled far in advance to be effective.

7. Publicize: Announce the scheduled meetings in releases to local papers, radio, and TV stations. Dramatize new, unusual, or outstanding sign installations, safety comparisons, and aids to business that outdoor lighting provides.

Sell with the Personal Touch

Frequent calls, layout services, special file of local lighting jobs help New Orleans Public Service make it easy for the customer to buy

JOHN D. HAVERKAMP, Commercial Supervisor, New Orleans Public Service, Inc, New Orleans, La.

Steady aggressive promotion — backed by a strong program of personalized customer service—is selling store lighting for New Orleans Public Service, Inc. Promotion is carried on 12 months a year, with extra bumps applied for two months every spring and three months every fall.

Making it easy for the customer to buy is essential to store lighting. This means personal selling, and NOPSI directs its selling efforts in this belief. Here's how:

- Each company commercial representative is assigned about 1,000 customers. Frequency of calls varies, but the goal is at least two per year per customer.
- A special file folder of local lighting data sheets is distributed. These show photographs of completed local installations along with brief descriptions of the lighting equipment. Testimonials are included. Sheets are printed at the rate of 12 per year in lots of 500 each.
- A lighting layout service is offered. The store is surveyed and then blueprinted recommendations are given the owner in an individualized presentation folder. Also included are Planned Lighting booklets, local lighting data sheets, and charts showing various color reflectance values. During 1955 some 570 lighting layouts were made. About 50% resulted in sales.
- Cooperation with dealers gets a lot of attention because the company does not sell commercial lighting equipment. A lead system is used. The dealer or contractor of the customer's choice is notified of the customer's desire to purchase equipment recommended by the company's representative. Last year 546 leads produced 293 sales.
- "Services That Help Build Your Profits," a locally-developed booklet is given both old and new customers by representatives on their calls. It details the company's various services, including Planned Lighting, available to the customer.

To reinforce this personal selling,

NOPSI this year will send out more than 100,000 direct mail pieces on lighting and lighting maintenance plus copies of a bi-monthly store lighting magazine.

A three-month campaign this fall will run concurrently with a Certified Lighting program. Initial training classes in Certified Lighting now are underway. The first class of 40 contractors, dealers, and utility salesmen met with enthusiastic response.

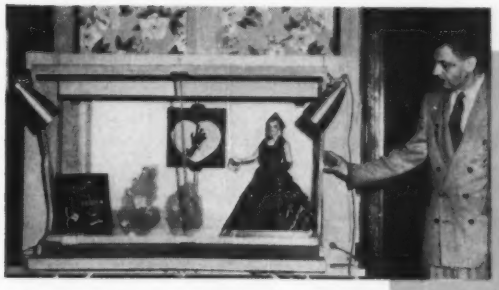
Equally enthusiastic are the company and its sales representatives. They remember the 1955 campaign and its results. Some 327 lighting jobs were installed and a lot of seed for future sales was planted. Of the 327 installations, 139 exceeded 30 ft-c in average illumination, and 58 averaged better than 50 ft-c. Additional load amounted to 1,431 kw. Eighty-four contractors and dealer salesmen participated.

In last year's campaign 15% of the lamps installed were incandescents. They ranged in size from 150 to 1,500 w. Of the fluorescent lamps more than 80% were in the 4-ft length.

NOPSI is a strong supporter of Planned Lighting. It believes PL provides triple benefits:

1. It will bring the merchant more business from satisfied customers, improve working conditions and morale of his employees.
2. Contractors, dealers, and manufacturers will profit from plus sales on new and relighting jobs.
3. The utility will be furnishing service to compact blocks of desirable high load factor kilowatts.

In New Orleans it is planned to continue aggressive promotional efforts coordinated with all segments of the lighting industry. Such a coordinated effort requires close cooperation among contractor, engineer, architect, dealer, manufacturer, and utility. The main benefit, however, goes to the user—the store enjoying the multiple advantages offered by high level Planned Lighting tailored to the store's own individuality.



By dramatizing unlighted window's "mirror effect" . . .

Traveling Display Builds Sales

A portable display window gave Pennsylvania Power & Light Co representatives a distinctive focal point in a series of lighting promotion meetings held last year. The 3 x 3 x 5-ft window was used to demonstrate how lighting creates atmosphere, directs attention, and eliminates daytime window reflections (see pictures.)

PP&L credits the display in helping materially to secure over 4,000 kw of additional store lighting load.

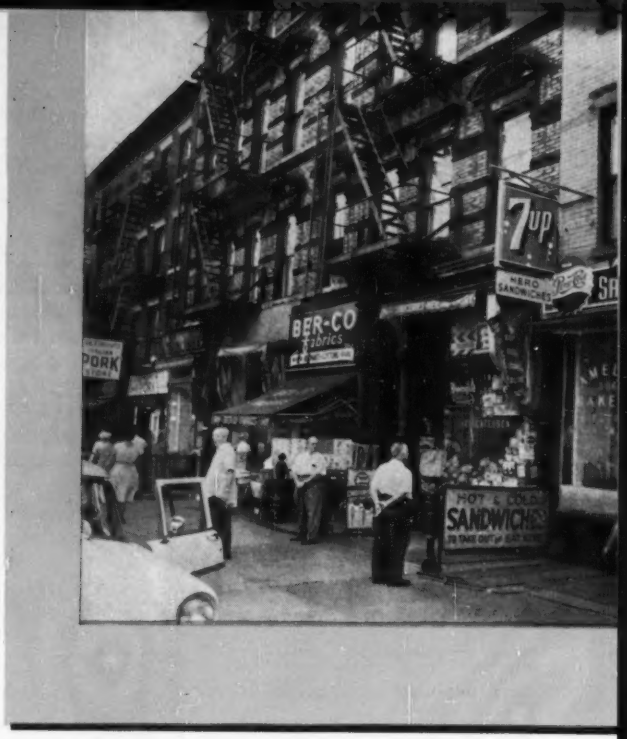
A three-dimensional device, the small-scale window is complete with general illumination, flood and spotlights. Shown before groups of 10 to 15 businessmen, it demonstrates how lighting:

- Combats reflections in windows.
- Spotlights featured merchandise to attract attention.
- Creates background and dramatic effects with color.
- Builds impulse sales with niche lighting.

Each presentation included slides showing local examples of good lighting practice, both exterior and interior, with special emphasis on color. Demonstrations were given for merchants in each principal city and town in PP&L's 10,000-sq mi service area. To boost attendance, letters, phone calls, and personal invitations were extended.

When disassembled and packed into crates, the display can be transported in a passenger car. Although when erected its dimensions limit audience size, PP&L regards this as an advantage. The informality of group discussion is gained, and representatives can tailor talks to suit specific needs of store owners

The window, made by an Allentown, Pa. cabinet maker, cost $1,500. Two other utilities have purchased similar models.



In Big City . . .

Small Stores Mean Big Business

Con Edison's target is 35,000 food stores. Free lighting studies spark owners' interest in 3-month campaign, set stage for future sales

Where does lighting stand in the competitive picture of small food store owners? Consolidated Edison Co of New York sees it this way: "Of all items of modernization, modern lighting, intelligently designed, achieves greatest volume of sales per sq ft, per sales person, and per dollar overhead."

Guided by this philosophy, here's what Con Edison accomplished in a three-month food store campaign:

- Gained $60,000 in estimated annual revenue.
- Added 602 kw load, an average of 1.7 kw per store modernized.
- Took a firm hold of the old problem of electricians "selling down" the lighting job. "The electrician," store owners were told, "is the man to install the job, but Con Ed engineers are the men to see for the planning."

Con Edison picked food stores as its lighting target for a number of reasons. First, they represent a big market (35,000 of them) well distributed over its service area. Second, food stores were suffering from vigorous competition and needed some means of increasing sales. Third, store owners were beginning to realize that low intensity lighting is the trade mark of the backward food store and that high intensity fluorescent lighting is becoming the trade mark of the progressive merchant.

Plan of Action

Here's how the company carried out its campaign:

Some 300 business representatives made personal calls on store owners. Prime prospects were new stores, stores undergoing renovation, and store owners known to be considering relighting. Salesmen carried with them a photo testimonial booklet and magazine reprints which featured installations planned by Con Edison.

When the sales rep found an interested prospect, a lighting specialist assigned to each district made an on-the-spot survey of the store's lighting needs. This survey then was sent to Con Ed's sales engineering division in its central offices where a formal recommendation was drawn up.

On his next call, the salesman brought with him a complete lighting layout recommending the number and type of fixtures, wattage and type of lamp, spacing, suspension, control, and ft-c estimates. It illustrated types of fixtures and suggested solutions to display, shelving, and window illumination.

In presenting the recommended layout, sales reps were encouraged to take these selling steps: **1.** Present the study only to the man who will make the decision. **2.** Show him the plan, explaining the number of rows and the fixtures per row and the spacing. **3.** Emphasize the layout's tabulation. **4.** Show him the drawing of a representative fixture. **5.** Use photos to help him to visualize complete installation. **6.** Urge that the owner get an electrician's bid on the recommended lighting. **7.** Urge him to have the electrician adhere strictly to the recommended layout.

Step No. 6 was seen as the biggest bottleneck to sales. No further progress was possible until the question of how much it would cost was settled. To get around it, the salesman urged the prospect promptly to call in an electrician for an estimate. He then made frequent follow-up visits to "keep the iron hot."

Success of the lighting layout activity, salesmen were told, depends upon the quality of the requests issued even more than upon the quantity. Of the 1,354 layouts drawn up, 339 or 24% of the store owners had electricians install the engineered lighting. And added load will be coming for a long time, Con Ed people believe, from prospects who liked the layouts but had to postpone the installation.

In a series of salesmen briefing sessions held before the campaign got started, the bulk of the prospects were defined as the "intermediate class"—those with not extremely poor lighting, but not good either. Salesmen were advised to let the store owner's circumstances dictate the type of lighting recommendations.

Time Table to Lighting Profits

Continuous promotion has added better than 5,000 kw in load a year for Arkansas Power & Light Co. Here's the schedule it followed

One store lighting campaign can bring results. But a year-after-year repeat of this basic campaign—with refinements—is where the real load lies. This has been the experience of Arkansas Power & Light Co.

Its first four-month Commercial Lighting campaign in 1952 added a load of 975 kw. The 1953 campaign added only 969 kw. Then the ball started to roll. In 1954, 2,065 kw were added, and in 1955 the total soared to 3,120 kw.

Similar results were shown by the annual increases in load connected: 5,736 kw for 1953, 5,726 kw for 1954, 6,855 kw for 1955, and 4,157 kw for the first five months of 1956.

These results were brought about by a two-prong campaign. One prong was directed at individual customer contact, the other to gaining mass customer coverage. AP&L endeavored to get at least one well-lighted store in each town. Then, with this as a nucleus, it carried on its campaigns of lighting education and promotion.

To acquaint the individual customers with the advantages of good light, personal calls, and individual demonstrations were used. Mass coverage was secured with group meetings, lighting shows, direct mail and local trade magazine advertising.

Here is a year-by-year report on the lighting campaigns:

1952

Four direct mailings were sent to the best prospects in each classification in each town. The 14 commercial sales representatives called on customers to tell the better light story and offer them the planning service. Each customer was offered a demonstration installation of a 4-lamp 40-w fluorescent fixture. Salesmen were given a catalog of lighting data and fixture information, prepared with the help of local distributors. Special discounts on fixtures also were offered by distributors during the campaign period.

1953

The basic campaign was retained. Advertisements were placed in state trade journals—the Arkansas Pharmacist magazine featured well-lighted drug stores, the Grocer's Journal contained food store lighting testimonials, etc. The catalog was brought up-to-date. Visualizers containing pictures, specifications, and testimonials from local lighting jobs were provided.

1954

Additions this year were group meetings and lighting show. A window lighting demonstrator and a service station flood lighting standard were included with the demonstration equipment. Direct mail sendouts were put on a year-round basis. A service booklet was prepared to explain the advisory and planning services available. A lighting show was developed and staged for store owners, architects, and contractors in 22 towns. Show consisted of a 28-min talk and demonstrations plus a display of modern lighting equipment.

1955

Demonstration equipment was added for outdoor flood lighting of commercial installations. Salesmen went back to areas where previous lighting jobs had been installed to build new sales.

1956

Flood lighting, service station lighting, and school lighting campaigns have been completed. Electric outdoor signs and advertisements and well-lighted windows are being stressed. For this fall's campaign, AP&L will concentrate on community development and modernization. Giant post cards will be used in its direct mail advertising.

Get Added Help from These Selling Aids

For promotional tools to supplement their own activities, utilities have four sources to draw upon: **1.** Edison Electric Institute's Commercial Lighting Committee, **2.** National Lighting Bureau and its Certified Lighting Program, **3.** Illuminating Engineering Society, **4.** Lamp and fixture manufacturers.

The EEI committee's demonstration equipment manual should be ready sometime this fall, says H. R Jones, retired chairman. Also planned is a new store lighting promotional booklet to replace the highly successful "We the People."

The National Lighting Bureau's Certification program is gaining momentum, reports Manager Lawrence Messick. Training courses have been authorized in six more cities—New Orleans; Omaha; Sacramento; Norwalk and Waterbury, Conn.; and Jackson, Miss.—to bring the total to 17. Utilities in Boston, Providence, San Diego, and San Francisco say they already have gained a total $139,450 in revenues through certified industrial-commercial jobs. The jobs resulted in more than 3,000 kw of new load.

Added to these are IES and manufacturers all of whom offer technical data, catalogs, literature, and training clinics designed to help you sell. To test your own store lighting program's effectiveness, turn to the sales quiz on the next page.

Test Your Store Lighting Buy-Q

How Many of These Proven Sales Techniques Do You Use?

W. M. SHEPHERD, Vice President, Arkansas Power & Light Co, Little Rock, Ark.

EDITOR'S NOTE: Questions and comments here are based on a study of 38 utilities' commercial and industrial sales practices made by Shepherd and presented at Edison Electric Institute's Annual Sales Conference last March. The more "yes" answers, the better your score.

A. TO DEVELOP PROSPECTS — DO YOU: Yes ☐ No ☐

1. Carry a footcandle meter?
Many people are not familiar with it and would like to know what it is and how it works. Yes ☐ No ☐

2. Use a Fluorescent Lamp Color Demonstrator?
The dramatic improvement in appearance provided by deluxe lamps will create interest in stores, restaurants, other public places.

3. Take your prospect to see good lighting installations in places similar to his own? Yes ☐ No ☐

4. Use your selected customers mailing list in planning sales calls? Yes ☐ No ☐

5. Make demonstrations for merchants of show-window and display lighting? Yes ☐ No ☐

6. Arrange for trial installation of several of the type fixtures you are trying to sell? Yes ☐ No ☐

7. Use handout literature? Yes ☐ No ☐
Read it through to your prospect before leaving it with him. Literature printed locally should feature photographs and testimonial statements from customers.

8. Send out mailing pieces? Yes ☐ No ☐
Special mailers are provided for specific groups in addition to regular magazines, such as Today's Business, Better Light Better Sight News, and Retailer Review.

9. Hold group meetings? Yes ☐ No ☐
These help you to present your story to a greater number of people. Take advantage of every chance to give a lighting program to civic clubs, school groups, and other organizations.

B. TO WORK WITH SALES ALLIES — DO YOU: Yes ☐ No ☐

1. Call on architects and engineers regularly?
They're important particularly on larger commercial jobs. Call on them regularly — **before** that important job comes up. Yes ☐ No ☐

2. Keep in close touch with builders?
On many jobs the builder decides on the lighting, and on any job his help is valuable in selling the owner. Yes ☐ No ☐

3. Use manufacturers' representatives?
They can provide you with valuable technical information. They regularly call on architects to supply design data. Yes ☐ No ☐

4. Know your distributor salesmen?
Lighting is their highest profit item but is only one of many items they sell to contractors. Get better acquainted with them and encourage them to promote rather than "quote." Yes ☐ No ☐

5. Work with the electrical contractor?
He is your most important sales ally, the key man in the lighting sale. However, many electrical contractors are not familiar with the procedure for making a properly designed layout, either through lack of experience or general knowledge of the requirements of good lighting. Secure the contractor's assistance or at least his cooperation. If he himself has a hand in the plans, he will be in a position to help sell the job.

C. TO PREPARE RECOMMENDATIONS — DO YOU: Yes ☐ No ☐

1. Bring the contractor with you to job?
Try not to make a layout without the customer selecting a contractor whom you will then bring on the job. The contractor will feel that he has been a party to the recommended layout and will be more likely to sell up to the full suggestions. Yes ☐ No ☐

2. Make an accurate survey?
Your first step in making a good recommendation is to make a good survey of the place to be lighted. This means accurate dimensions, location of obstructions (beams, columns, ducts, etc.) as well as any special conditions to be considered. Yes ☐ No ☐

3. Keep up-to-date catalog file?
Your job of making recommendations will be a lot easier if you keep a well-organized file of manufacturers' catalogs and design data. Yes ☐ No ☐

4. Write up your recommendations?
All recommendations should be in the form of written Planned Lighting Layouts. Oral recommendations are often inexact and susceptible to errors.

D. TO SELL YOUR PLAN Yes ☐ No ☐

1. Do you sell the benefits instead of the product?
The average merchant is not particularly interested in fixtures and lamps, fuses and wire — but he is interested in something that can make his store stand out and increase his sales.

E. TO FOLLOW THROUGH — DO YOU: Yes ☐ No ☐

1. See the job through — even to the last lamp?
There are too many things that can come up between the time you present your layout and the time the job is installed — even though the prospect has assured you that he wants what you recommend. The customer may run into financing difficulties, fixture delivery may be slow, or maybe a friend will tell him he can get by with a cheaper job. Yes ☐ No ☐

2. Check the work afterwards?
After the job is completed, check it over and make footcandle measurements to assure the customer that he has what he needs. Yes ☐ No ☐

3. Get testimonials?
On outstanding jobs try to get a "testimonial" from the owner on what improved lighting is doing for him and arrange for photographs.

Equipment standardization and higher voltages help Duke Power to

KEEP AHEAD OF RAPIDLY RISING LOAD

Duke Power Company with headquarters in Charlotte, North Carolina serves a 24,000-square-mile area in the Piedmont Carolinas containing 2.9 million people. A population boom since World War II has sky-rocketed Duke's residential load from 349 million kw-hr in 1945 to over 2 billion kw-hr in 1955. At the end of World War II, residential represented only 10% of the company's total load. Today the residential load accounts for over 20%.

Along with the population influx, textile and other industries have moved into the area, posing a problem for Duke engineers: how to meet the ever-changing needs of the present, and prepare for future load growth.

Duke Power has a two-fold solution to be achieved through overlapping plans based on five- and ten-year forecasts. Equipment is being standardized and higher distribution voltages are being employed where beneficial. Flexibility keynotes the success of the plans, permitting modifications for changing markets and growth patterns.

TURN PAGE FOR MORE DETAILS ▶

MORE POWER TO AMERICA

GENERAL ELECTRIC

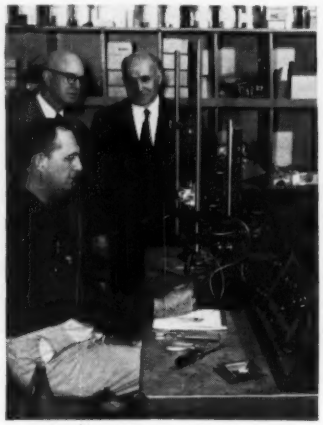
MEETING TOMORROW'S DISTRIBUTION NEEDS

Duke Power

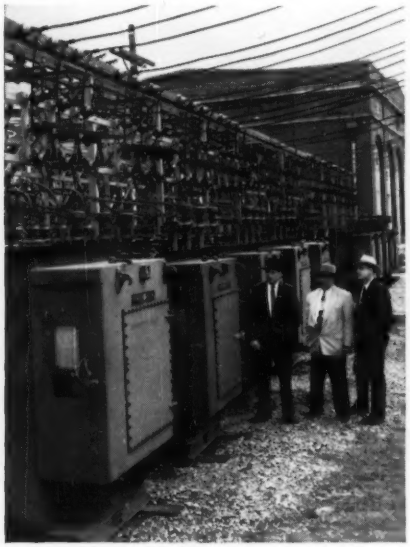
CO-OPERATIVE TEST by Duke Power and General Electric has been conducted for over a year on this 240-v, 5%, 3-kvar series capacitor designed for application in the primary neutral of a 15-kva distribution transformer. P. D. Huff of Duke Power, l., and J. P. Ruddell of General Electric discuss test.

GREATER SYSTEM FLEXIBILITY, lower-cost future expansion are assured in Charlotte, by G-E network transformers connected for 277/480Y spot network, one of several such installations. Discussing it (l. to r.): J. W. Foster, Duke; J. P. Ruddell, G.E.; F. W. Edwards, Duke; and J. R. Stevenson, G.E.

STREET LIGHTING in Duke Power's service area includes such examples of progressive community activity as these General Electric Form 400 luminaires which provide comfortable vision on Highway 21, Charlotte, North Carolina.



LONG LIFE, reliability, and minimum maintenance are features of I-55 meters. This meter test by J. R. Griggs of Duke Power is observed (l. to r.) by R. D. Hilley, G.E.; and J. J. Strickland of Duke.



EQUIPMENT RELIABILITY is shown by these General Electric step-voltage regulators, which have operated over 140,000 times each in 3½ years without excessive contact wear. (L. to r.) J. P. Ruddell, G.E.; G. T. Finger, Duke Distribution Engineer; S. W. Johnson, G.E.

streamlines its distribution system through five-year and ten-year plans

Standardization on General Electric equipment helps increase system flexibility

The rapid expansion of textile mills in the Piedmont Carolinas—Duke Power's service area—has increased the need for considerably more electric power over a relatively short period of time. Much of it must be distributed over rugged terrain and hilly countryside, making equipment reliability of paramount importance. And, modern textile mills with integrated operations have exacting requirements.

Duke Power engineers, calculating on the basis of five- and ten-year forecasts, programmed a transition to standardized equipment for economy. They are also increasing voltages from 2400/4160 to 7200/12470, and in some areas 14400/24900Y, for improved system regulation and increased flexibility.

Typical of Duke Power's progressive attitude is the co-operative test with General Electric of a 240-v, 5 per cent series capacitor designed for application in the primary neutral of a 15-kva distribution transformer. This effort to achieve approximate self voltage regulation of individual transformers serving low-power-factor air-conditioning loads is a good example of searching out the advantages of new apparatus and the guidance of General Electric application engineers.

When you specify General Electric, you take advantage of the latest advances in apparatus design, construction and application. That's because General Electric engineers are trained to translate the trends and needs of growing systems as reported by field personnel, incorporate newest materials and manufacturing techniques in producing them, and provide help in putting these advances to best possible use on your system.

And to help utilities keep service running smoothly, highly trained General Electric service engineers plus a nation-wide network of Service Shops stand ready to meet any and all maintenance and repair needs—day and night.

For full information on distribution equipment and distribution system services, contact your nearby General Electric Apparatus Sales Representative, authorized Agent, or Distributor today. General Electric Company, Schenectady 5, N. Y. 303-2

DISTRIBUTION SYSTEM COMMITTEE for Duke Power sits in session regularly at Charlotte, N. C. to discuss present problems and future planning—an interplay of ideas resulting in creative approaches. Here, P. A. Fry points out advantages of using reclosers. Seated at his right is Chairman C. B. Miller, Assistant Supervisor of Branches.

TURN PAGE FOR MORE ON MEETING TOMORROW'S DISTRIBUTION NEEDS

MORE POWER TO AMERICA

GENERAL ELECTRIC

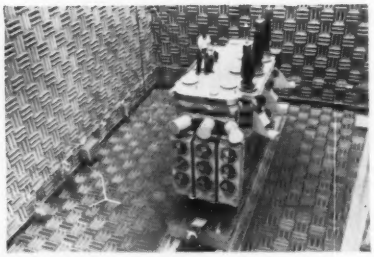
MEETING TOMORROW'S DISTRIBUTION NEEDS

ASSISTANCE FOR UTILITY ENGINEERS is provided by local application engineers. They spur use of latest ideas, product advances, help with system designs and equipment selection. These engineers are analyzing a system design problem.

Constant exchange of advanced ideas helps

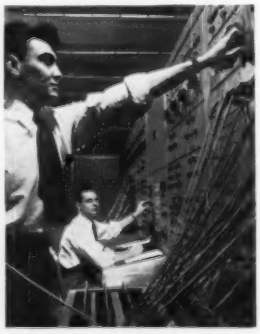
General Electric application engineers aid utilities with sound system planning

More reasons why it pays to see General Electric about your distribution problems



BETTER EQUIPMENT comes from continuing product development. Above, General Electric's $1,500,000 anechoic chamber is used to study power transformer noise.

GENERAL ELECTRIC INVITES utility engineers to study meetings, thereby helps them plan distribution systems and products. Interflow of ideas helps answer latest field problems.



ENGINEERING TRAINING includes Power Systems Course, Electric Utility Systems Course, board studies.

Duke Power is a typical case of cooperative engineering. General Electric application engineers worked closely with Duke Power engineers in planning network transformers in Charlotte, N. C. These transformers are now used in a 277/480-v spot network radial system. Future conversion to a network system —according to the dictates of load growth—will be less costly, as new load and new transformers can be added to a network system without making additional system studies.

The full range of General Electric's distribution system services includes headquarters system planners—district application and product engineers—extensive product development facilities —equipment installation and field service engineering—complete interflow of ideas. These services offer assurance of maximum operating continuity, on-the-spot application help, greater equipment efficiencies, valuable help in system design and techniques. Get the full story from your General Electric Apparatus Sales Representative. General Electric Company, Schenectady 5, N. Y. 303-2

LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

GENERAL ELECTRIC

DISTRIBUTION—Construction

Treated Asbestos Arc-Proofs Manhole Cables

A treated asbestos tape today arc-proofs high-voltage cables in the manholes of Consolidated Edison Co of New York. Under test conditions, this tape withstood direct application of a 200-amp arc from ⅞-in. electrodes and protected the cable's lead sheath from damage for more than 30 sec.

The tape is easily applied, a splicer and his helper doing the arc-proofing immediately upon completion of the splice. Although the materials are more expensive than the use of cement, employment of the splicer's spare time was found to cut the overall expense of arc-proofing to a point comparable with the former cement method. There is a definite advantage to the company in having the splice arc-proofed immediately after completion of the splice.

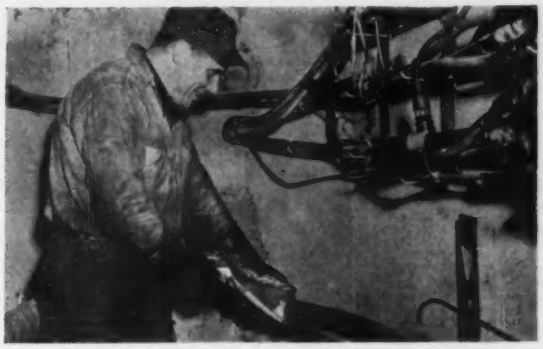
In applying the asbestos, the primary cable is wrapped first with a moisture-resisting tape to reduce electrolytic corrosion. Then a layer of butt-lapped plain asbestos tape is applied. The treated tape is wrapped over this layer with its butt-lapped joints centered between the joints of the first wrap. Blankets go over the joints, and the whole assembly is tied in with glass cord.

Old Arc-proofing Described

When a primary cable in a manhole fails, even though cut-off devices are installed, additional protection must prevent the arc from the defective cable from damaging adjacent cables. Con Edison formerly arc-proofed primary cable and spliced sections with a series of materials. First the cable was wrapped with a moisture-resisting tape. Cement and sand, mixed to the consistency of putty, was next applied. The mixture was formed by hand around the cable and held in place by cheesecloth wrapped over the cement. This process took time, as well as a second visit to the manhole by another crew after the splicing crew. Although materials were inexpensive, their application was time-consuming, inconvenient, and expensive.

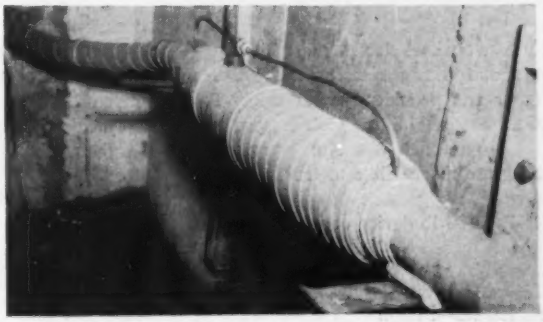
As Con Edison expanded facilities, more cables required arc-proofing. The company began searching for a material improving upon the physical properties of cement, so that protection could be more easily and quickly applied, preferably at the time the cable connection was made. The material had to protect adjacent cables from the arc of a defective cable long enough to allow automatic relays to disconnect the defective one from the source. It was desirable that this material also protect cables from a manhole fire until the flames could be extinguished.

In practical thicknesses, plain asbestos cloth and tape have arc and fire-proofing characteristics. But asbestos needs treatment to prevent cotton supporting fibres from rotting. Con Edison asked several manufacturers to develop an impregnated asbestos cloth whose fibres would be held together by the impregnating compound even though the cotton binding were to rot.



OLD METHOD of arc-proofing cables with cotton and asbestos cement was messy for workmen, time consuming, expensive

NEW METHOD, using treated asbestos tape, is simple, clean and fast. Also splicing crew can apply the arc-proofing



TREATED ASBESTOS TAPE contains arc from cable rupture and allows gases to escape, confining blowout damage

Photos: Courtesy of Minnesota Mining & Manufacturing Co

Asbestos Tape is Porous

Cement frequently blew off a defective cable at the point of failure. The asbestos tape is porous enough to allow expanding gases created in a blowout to escape through the fabric while the arc is contained. Furthermore, it can be easily removed for inspection of the cable and immediately replaced. An arc-proofing crew had to patch a break made in the concrete for cable inspection.

TRANSFORMER rests on a hinged shelf attached near the bottom of the frame and is secured with a chain and boomer

CHAINED to the pole is the hoist which will raise an estimated load of upwards to 600 lb at a rate of about 50 fpm

Two-Wheel Cart Carries, Lifts Safely

R. N. ROUSE, General Substation Foreman, Gulf States Utilities Co, Beaumont, Tex.

A two-wheel electric hoist for carrying and lifting transformers reduces labor and provides greater safety for Gulf States Utilities Co's line crews. It is particularly useful when pole lines are inaccessible to trucks having winches.

The 200-lb device consists of a pipe frame with two rubber-tire wheels. On one side of the frame are welded two curved brackets carrying boomers for fastening to the pole and a hinged shelf at the bottom for carrying transformers. Bolted to cross members on the other side of the frame is the hoisting mechanism, a 1-hp, 120-v motor driving an Army weasel capstan. A belt drive affords quieter operation.

For lifting, the hoist is secured to the pole, and the motor connected to either an engine-generator set or the overhead secondary. The line of a block and tackle is wrapped around the capstan, and very little manpower is required to raise a load up to an estimated 600 lb at 50 fpm.

Handles at the top of the frame telescope out to extend the length of the frame some 16 in.

METERING—Design

Simple Relaying Prevents Demand Meter Errors

E. S. DAVIS and **H. W. ROSS**, Supervisors, Meter Department, Potomac Electric Power Co, Washington, D. C.

A simple relay scheme, developed by Potomac Electric Power Co, switches the single-phase clock motor of a demand meter to an energized phase when an outage occurs on a phase of a 4-wire distribution system. Use of the scheme prevents erroneous or off-scale readings of demand meter registers and, thus, eliminates possible high-bill complaints.

35 Meters Modified

The relay scheme consists of two dc relays and two selenium rectifiers, connected as shown in the diagram. When any one or two phases of the metered circuit are "out," the clock motor is automatically switched to an energized phase. Thus, the demand indicator cannot wander, and errors in demand register readings are eliminated.

During the past 2½ years, 35 meters have been modified with this relay scheme. These meters are installed in suburban areas where the possibility of outages on the overhead system is a bit greater. And no failures or trouble have resulted from the modifications since they were made.

With proper arrangements the relays and rectifiers, costing about $10, can be mounted within the case of certain standard meters. When desired the components can be mounted externally for use with other demand meters having clock motors.

(*More How To on page* 118)

ENGINEERING LEADERSHIP
KEY TO ATOMIC PROGRESS

G-E Engineers "Cook" Fuel Plates at 1000° F. in Special Test Loop

Testing atomic products before they're built is a good trick—if you can do it.

One way General Electric engineers do just this is with a special test loop designed to simulate reactor core thermal conditions. Fuel element materials and designs can be pre-tested in this loop for void distribution and steam slip, steam blanketing, and heat transfer characteristics—all while the reactor is still on the drawing board.

Proving critical calculations like these *in the design stage* is another example of General Electric engineering leadership in the field of atomic energy.

Atomic Power Equipment Department, General Electric Company, Schenectady 5, New York. 156-1

Progress Is Our Most Important Product

GENERAL ELECTRIC

DISTRIBUTION TRANSFORMERS

THIS CORE AND COIL

COULD SAVE YOU...$88

Estimate your possible savings in terms of all transformers on your lines

Buying a new self-protected 5-kva 7200-volt transformer with taps, two bushings, and two arresters, breaker and signal light, costs about $190. A General Electric Service Shop, however, can replace your burned-out core and coil with a new core and coil, new fuses, and new oil for about $102. You save about $88 and get a new-transformer warranty.

G.E.'s uprating service can also save you money. In addition to simply replacing burned-out cores and coils, your G-E Service Shop can uprate old and burned-out transformers both in kva and voltage, and can also convert conventional-type units to self-protected units if you wish. A conventional 1½- or 3-kva, 2400-volt transformer, for example, can usually be uprated to 5 kva, and a 5-kva unit to 7½ or 10 kva, either 7200 or 7620 volts, and converted to a self-protected type. Both routine rebuilding and emergency repairs are as near as your telephone—there are 34 G-E service shops in major cities.

Look at the other money-saving features that prove "all transformers are not alike": **Impulse testing,** for instance, saves years of transformer life. **One-piece clamping bands** save maintenance time. Re-usable **Nitrile rubber gaskets** help save units from contamination. **AL/CU terminals** are designed to prevent both copper and aluminum conductors from loosening. **Strenicor terminal clamps** save terminals from breaking. **Super Melaglyp paint** saves up to two repaintings. **Nationwide warehouses** save utilities heavy inventory expense.

For the complete story, contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Section 431–40, Schenectady 5, N. Y.

dollar-saving features prove ATANA*

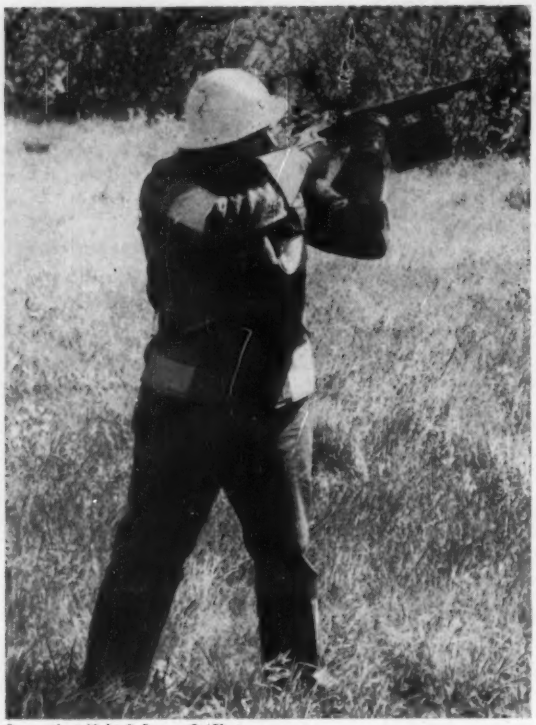
***ALL TRANSFORMERS ARE NOT ALIKE**
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	√			√		√
Nitrile rubber gaskets	√					√
One-piece clamping band	√					
H-v and l-v terminals handle both copper and aluminum conductors	√					
Strenicor pressure terminal clamps	√					
Super Melaglyp paint	√					
More than 100 warehouses	√	√				
Nationwide, company-operated service shops	√	√				

Progress Is Our Most Important Product

GENERAL ELECTRIC

Line-Throwing Gun Speeds Flood Restoration



Connecticut Light & Power Co Photo

What appears to be a sawed-off shotgun is used by the Connecticut Light & Power Co operating department for throwing a line in many unusual situations that face the company in its varied operations.

The gun is charged with a 45.70 blank cartridge for firing a ½-lb brass rod which carries 550 ft of double-weave nylon line. This line is housed in a barrel-like device attached to the underside of the weapon. Tested under many different weather conditions, the line was found capable of being thrown an average of 450 ft. The extra 100 ft allows for drift, depending on the strength of the wind.

Line-throwing guns were first used by the company, on a loan basis, during last year's floods. One gun threw a line across the raging Naugatuck in Waterbury, and the other spanned the Housatonic near New Milford. Both guns proved effective in getting lines to almost inaccessible places.

In the Danielson area, a guystrand, which is a single wire supporting a "bosun's chair" device for maintenance crews, had been swept away from a 100-ft river crossing during the floods. CL&P crews assigned to replace it, found their job hampered by an unusually swift current. One shot of the line-throwing gun easily spanned the crossing, and the guystrand was soon secured on both river banks.

CL&P line and maintenance crews feel that this piece of equipment will find many uses during the day-to-day operations of keeping electric service dependable.

SAFETY

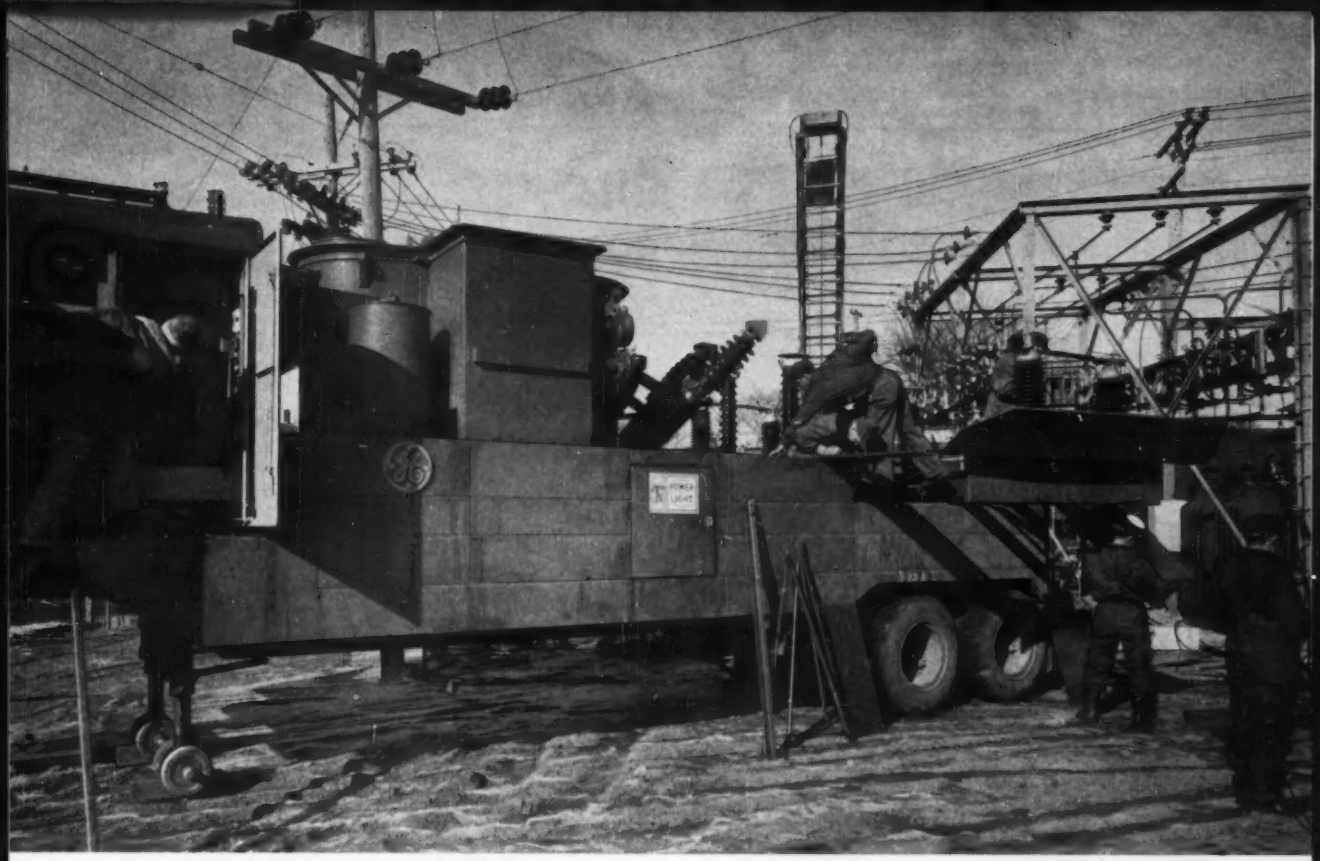
Meter Reader Cap Liner Shields Head

A lightweight, plastic uniform cap liner, developed by company safety men, will soon afford Consolidated Edison Co of New York meter readers with effective protection against accidental head bumps.

The Nesmo hat liner, named after Robert Nesbit and Richard Molen, was designed for uniformed personnel. It is a shaped crown that fits inside a uniform cap and is held in place by an attached plastic anchor strap which tucks behind the sweat band. A foam rubber pad centered in the underside of the crown cushions against impact with an overhead object. The liner will be available to personnel as standard equipment.

(*More How To on page* 124)

DESIGNERS, Richard Molen (left) and Robert Nesbit, safety inspector and safety lecturer, respectively, show a uniform cap equipped with the new "Nesmo" liner



GENERAL ELECTRIC Mobile Unit Substation

PAYS FOR ITSELF by reducing routine system maintenance expense

"We certainly feel that this unit is paying for itself during routine maintenance. Variations in voltage make it adaptable in many locations for a variety of jobs." This statement by Mr. Anthony Zanskas, Assistant Superintendent of Substation Construction and Maintenance, Wisconsin Power and Light, expresses the findings of many progressive utilities.

"Labor and material savings, by using the mobile unit substation for by-passing entire small substations for maintenance and transformer changes have been great, as we have been able to do this work on de-energized busses and equipment with a minimum amount of material and preparation and without any delay or outages." This additional endorsement by Mr. Carl Takle, Wisconsin P & L's Superintendent of Substation Construction and Maintenance, further demonstrates how General Electric mobile unit substations are paying off as a versatile, economical means of speeding routine system maintenance, in addition to their value as stand-by or emergency equipment.

General Electric mobile unit substations are designed for maximum versatility, with provision for various voltage combinations, if required, to meet all application needs. Each substation is a complete, fully coordinated unit, mounted on a high-speed trailer, designed for normal highway operation. For further information, contact your local G-E Apparatus Sales Office or write for bulletin GEA-4415 to General Electric Co., Schenectady 5, N. Y. 422-26

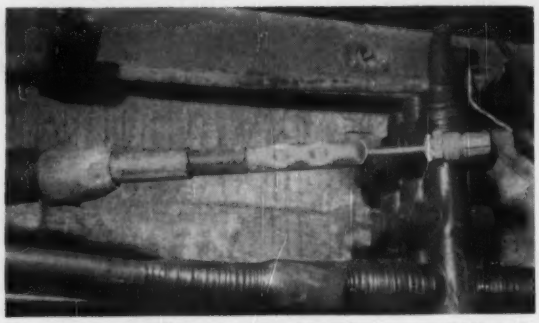
Typical six-months' operating log for Wisconsin P & L's 5000-kva G-E Mobile Unit illustrates high utilization factor. All these stops were for routine maintenance.

Location	Installed	Removed	Days	Mileage
Oregon	2–22–55	3– 6–55	13	25
Tomah	3–10–55	3–16–55	7	110
Prairie Du Chien	3–18–55	3–18–55	1	94
Baraboo	4–19–55	4–23–55	5	98
Fox Lake	5– 7–55	5–18–55	12	35
Janesville	6– 7–55	6–29–55	23	82
Mauston	7–12–55	7–19–55	8	100
Dorset	7–21–55	7–22–55	2	10
Darien	8–11–55	8–11–55	1	120
Portage	8–19–55	8–20–55	2	90
Evansville	8–23–55	8–23–55	1	45

SIX-MONTH TOTALS: 11 Locations
75 Days in Service—809 Miles Traveled

Progress Is Our Most Important Product

GENERAL ELECTRIC



Secondary network joint formed by limiter on PILC cable is first degreased, then dried, and . . .

PILC Cable Joints Sealed in Short Time

An improved technique for sealing paper-insulated lead-covered (PILC) cable joints on secondaries has reduced installation time by about 66%.

GEORGE K. MERZ, Testing Dept, Portland General Electric Co, Portland, Ore.

given thin coat of oil-proof adhesive before being wrapped in two layers of self-vulcanizing oil-proof . . .

Sealing method outlined here is used to prevent loss of oil at joints of paper-insulated lead-covered cable. Accompanying illustrations are steps in making joints where limiters and moles are employed, as in underground secondary networks.

Former sealing methods required long waiting periods for drying and making an effective seal.

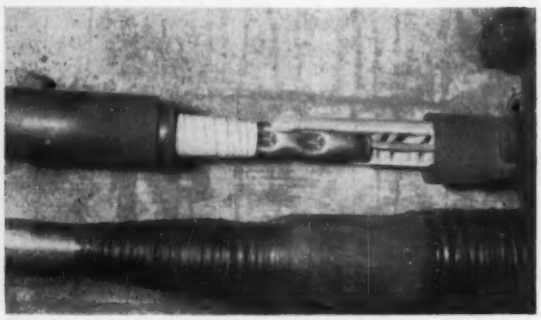
In this technique, the joint is prepared in the normal manner, then cleaned by wiping with a solvent such as a degreasing fluid and dried with a rag.

For the sealing process, a thin coat of oil-proof adhesive is applied and allowed to become tacky. Then an oilproof vulcanizing tape is half-lap wrapped over the entire joint. As the tape is applied it is stretched from its normal ¾-in. width to ½-in. width. To assure that the tape vulcanizes to itself, it should be warmed to 140 F with torch or heated roller and rubbed gently with the hand. A second coat of oilproof adhesive is applied. Then the joint is half-lap wrapped with two layers of cotton tape, to provide mechanical strength. Next, the cotton tape is coated with the oilproof adhesive to make a clean joint. Now the limiter's free end is screwed into the mole; an Asbestite enclosure is placed around fusible element of the limiter, and rubber sleeves are snapped together.

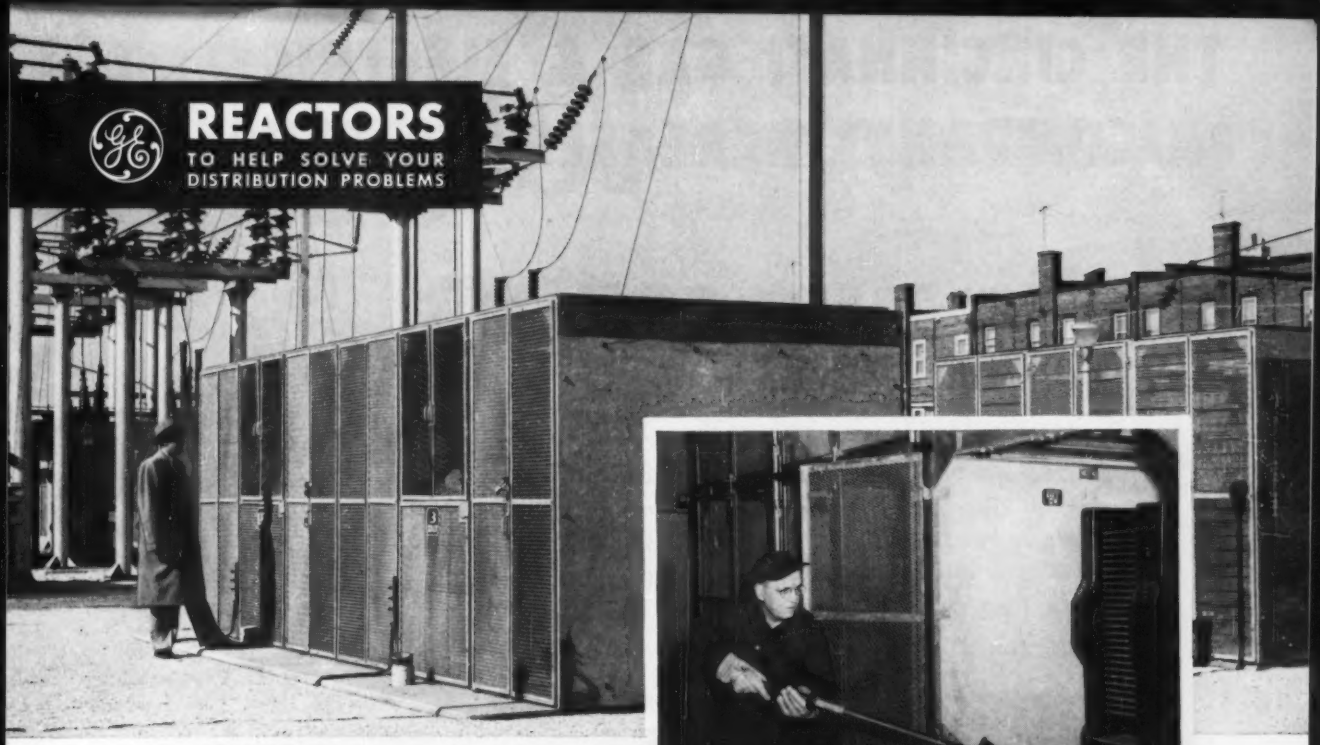
Pressure reached in low-voltage cables, even under severe loading should not exceed 8 psi at 140 F. This joint will hold oil satisfactorily at 25 psi and 140 F for an indefinite period.

tape stretched from 0.75 in. to 0.5-in. width. A 140-F roller is used to assure vulcanization. Next covering . . .

is another coat of oil-proof adhesive to insure a bond with the following two layers of half-lapped . . .



cotton tape (top) which is also covered with the adhesive. After additional wrappings, joint is completed.



PHILADELPHIA ELECTRIC employs 5%, 13.8-kv reactor bank at Angora substation, West Philadelphia. At right, workman checks voltage on G-E 10%, 13.8-kv reactor at Spruce Street substation.

Philadelphia Electric shows how

General Electric Reactors Reduce System Investment

Philadelphia Electric Co. has adopted standardized short-circuit ratings on switchgear and other system equipment—150,000 KVA on all 2400- and 4160-volt feeders; 150,000 or 250,000 KVA on 13.8-kv lines. Reactors are used to limit feeder duties to these values. Results: cost savings through quantity equipment purchases; additional savings since reactors often permit selection of less-costly switchgear having lower short-circuit capacity.

RELIABILITY: The almost-perfect service record of G-E reactors attests to dependability of G-E cast-in-concrete design, with such features as:

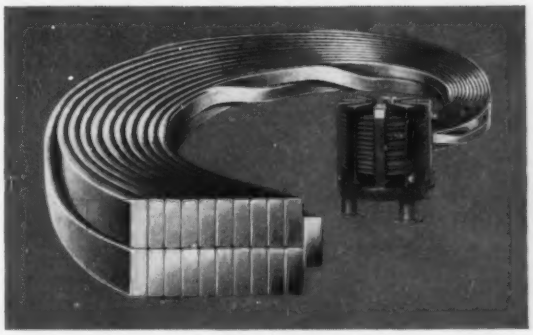
Wet-steam-cured concrete: full strength when shipped avoids potential danger of "in-service" curing.

Rectangular transposed conductors: minimum losses and increased short-circuit strength.

Non-aging glass insulation: optimum temperature and moisture resistance, high dielectric strength.

Aluminum conductors as standard construction: nearly 10% saving over designs using copper.

Repetitive-Manufacture designs with aluminum conductors: 8% added saving plus shorter shipment. For full information contact your G-E Apparatus Sales Representative, or write to Section 422-30, General Electric Company, Schenectady 5, N. Y.



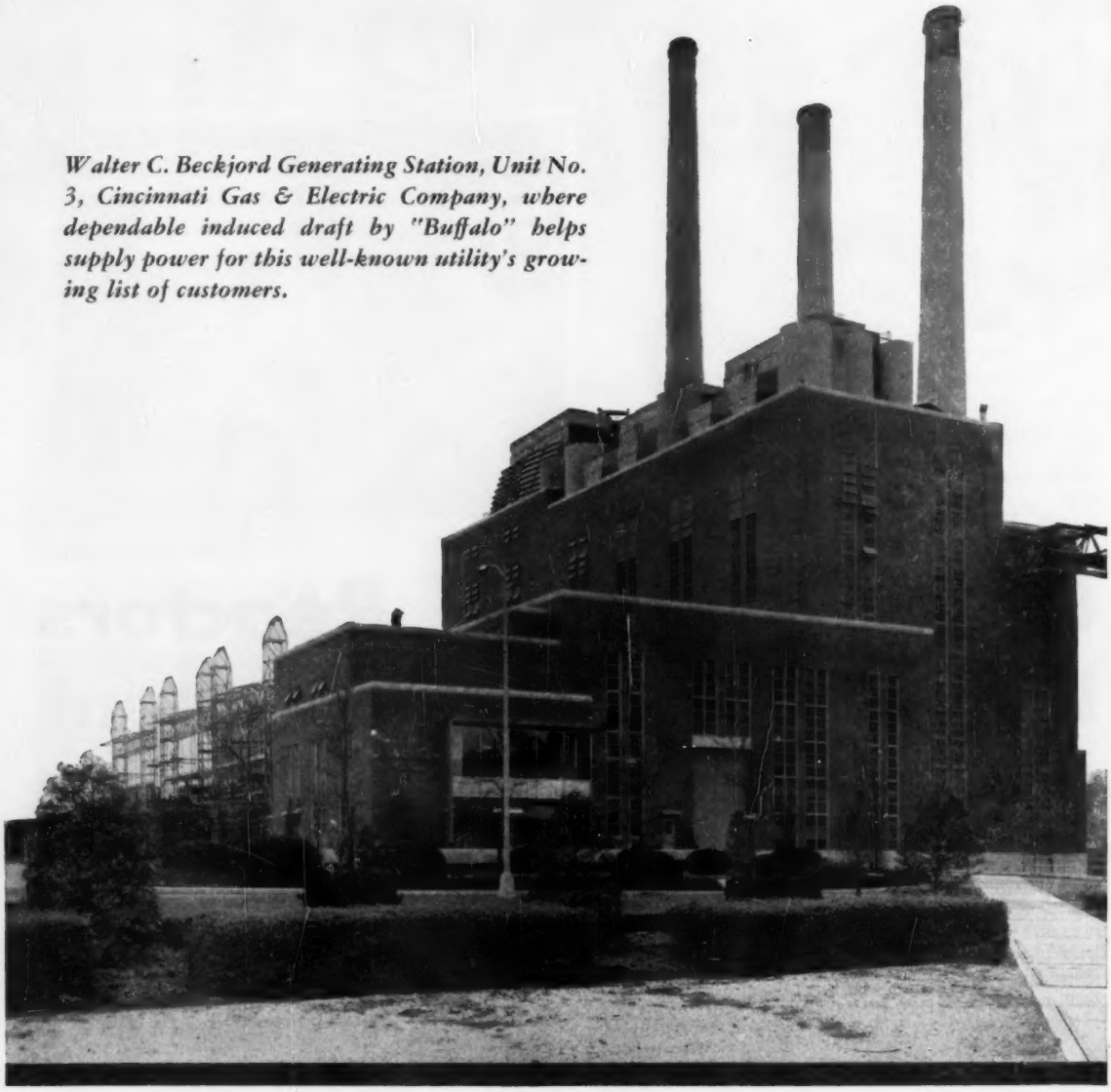
RECTANGULAR TRANSPOSED CONDUCTOR, an exclusive G-E feature, provides highly uniform current distribution with lower skin-effect losses; permits size reductions over round cable up to 20 percent without sacrificing electrical turn-to-turn insulation.

Progress Is Our Most Important Product

GENERAL ELECTRIC

THE CINCINNATI GAS & ELECTRIC COMPANY INCREASES ITS CAPACITY

Walter C. Beckjord Generating Station, Unit No. 3, Cincinnati Gas & Electric Company, where dependable induced draft by "Buffalo" helps supply power for this well-known utility's growing list of customers.



BUFFALO FORGE

BUFFALO,

Canadian Blower &

VENTILATING AIR CLEANING AIR TEMPERING PRESSURE BLOWING

. . . SPECIFIES "Buffalo" INDUCED DRAFT FANS

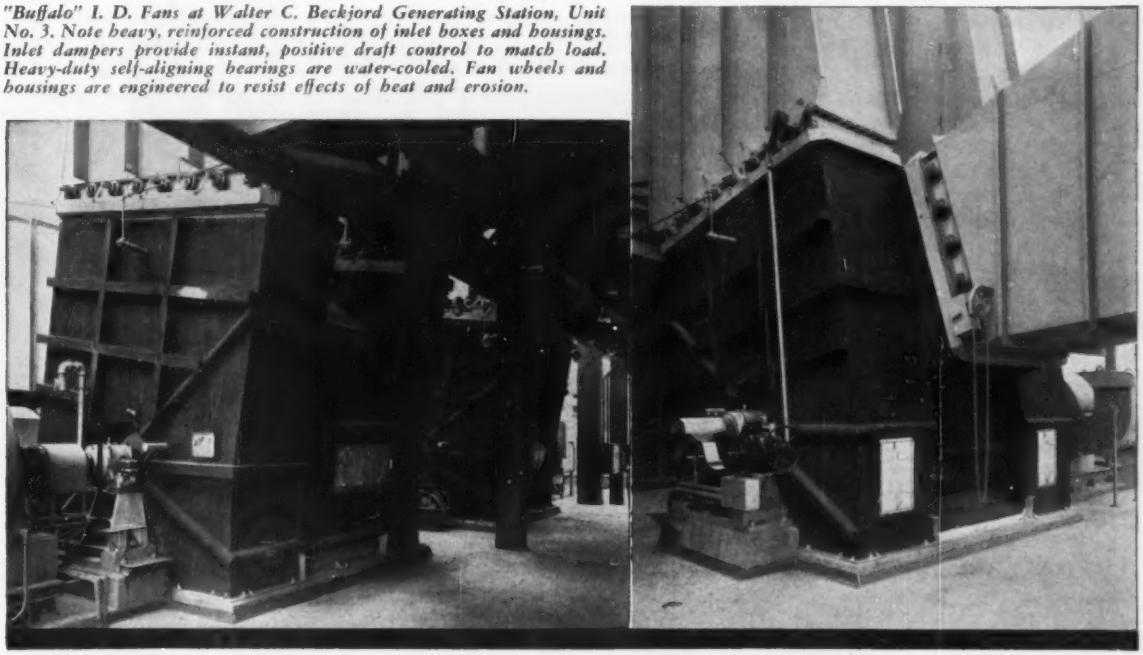
Additional "Buffalo" fans ordered for another unit to start up in December 1957

The Cincinnati Gas & Electric Company, pushing through its ambitious program of expanded service, specified "Buffalo" I. D. Fans for both this new Unit No. 3 station and Unit No. 4 which will be operating in 1957.

Selection of "Buffalo" by leading utilities for many, many years is your assurance of dependable, economical draft service. In fact, the "Buffalo" Mechanical Draft Fan you specify embodies the best of our 79 years of fanmanship — peak endurance, peak efficiency for its job — in other words, the "Q" Factor* that's built into every "Buffalo" Fan. You'll be interested in our new, improved lines of forced and induced draft fans — write for engineering data today!

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo" I. D. Fans at Walter C. Beckjord Generating Station, Unit No. 3. Note heavy, reinforced construction of inlet boxes and housings. Inlet dampers provide instant, positive draft control to match load. Heavy-duty self-aligning bearings are water-cooled. Fan wheels and housings are engineered to resist effects of heat and erosion.



COMPANY

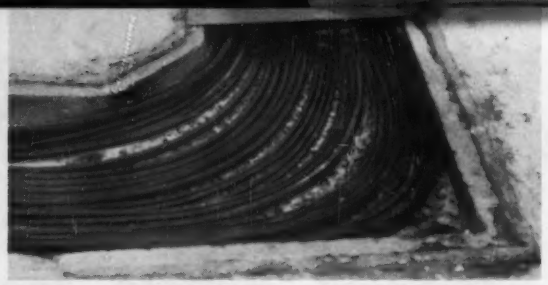
NEW YORK

Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING

GRAVEL-FILLED TRENCHES, as shown above, are constructed from open concrete sections. They cost only $11 per foot



A GRAVEL-FILLED TRENCH 24 in. wide can be constructed to accommodate up to 60 cables of 1 in. or smaller diameter

SUBSTATION—Construction

Shallow Trenches Cut Cable Installation Costs

C. A. CABRAL, Electrical Engineer, Bureau of Reclamation, Denver, Colo.

Gravel-filled shallow trenches made of concrete sections are reducing the cost of substation cable trench installations by 50% for the Bureau of Reclamation.

This type of trench provides for buried cable entrances to equipment for virtually the entire cable run. It eliminates conduit runs from the trench to equipment.

Cables leave the trench through the gravel bottom and are buried directly in the earth from trench to equipment conduit which terminates at the top of the gravel surface. It is not necessary to have detail conduit drawings or to locate precisely the conduit risers to coordinate with equipment conduit entrances.

Construction cost of the shallow trench, including concrete placement, is $11 per ft.

Sections 32-in. Wide

Precast concrete sections may be supplied by the contractor, although bureau specifications do not require them. All sections are 32-in. wide overall. Straight sections are 5 and 10 ft long. Corner sections have one 2.5-ft leg, the other varying from 2.5 to 8 ft. T-sections are 5 ft long and 2.5 ft wide from the center line to the bottom of the T.

Plates in 5 Shapes

Because cover plates comprise a substantial part of the material cost, the minimum width of sections is 24 in. to limit the thickness of the plates.

A maximum of five shapes of ¼-in. thick aluminum over plates, about 23½ in. wide, meet the configurations presented by the sections. Plates for straight sections can be furnished in convenient lengths. Plates for corners and T-sections are shaped accordingly.

Cable is buried in the trench throughout the entire run to the substation equipment. It is covered by 2x8-in. treated timber. No conduit is needed. T-sections serve as taps or branches to the main trench system. Trench walls are joined at the base at about every 4 ft 8 in. by an 8-in. wide concrete member. Remainder of the trench bottom is open and filled with gravel.

Although wider trenches, requiring thicker cover plates, could be used, two 24-in. wide parallel trenches cost less than a single 48-in. wide trench.

The 24-in. trench can accommodate about 60 cables of 1 in. or less diameter.

Where required, trench sections can be supported by foundations of sufficient depth to minimize heaving when the ground thaws. Foundations may be used also to elevate the bottom of the trench above subgrade, but below the gravel surface, to improve drainage.

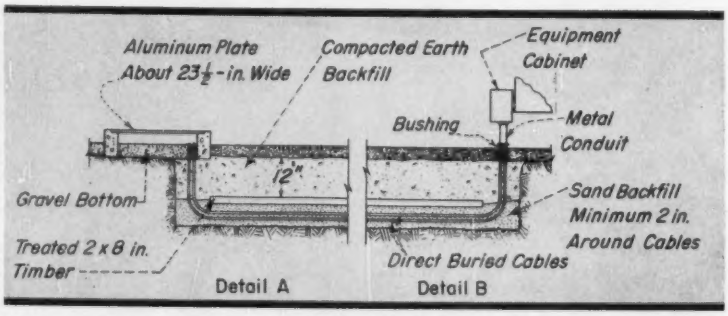


FIG 1—CABLES leave trench through gravel. Conduit risers to equipment don't require precise location. The installation cost includes concrete placement

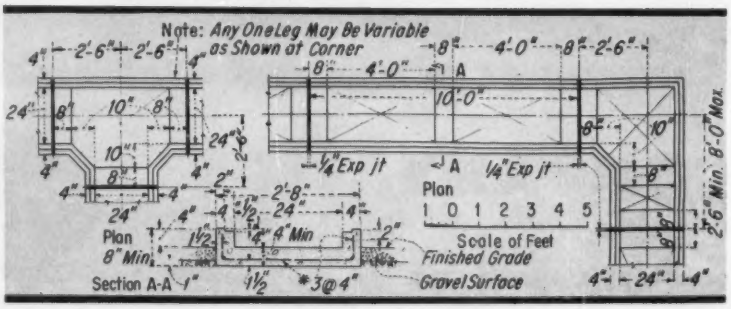


FIG 2—STRAIGHT SECTIONS of concrete, the T-shapes, and the corners may be poured in place or precast at contractor's option. Each section's 32-in. wide

"You'll find this link stick on the LP* list"

O. G. "ANDY" ANDERSON, Veteran Hot Stick Man and Product Merchandise Manager, A. B. CHANCE COMPANY.

LP*...(LINEMEN'S PREFERENCE)...the new, easier way to select Hot Sticks for your maintenance crews

LP* means Linemen's Preference—a term we've applied to the hot line tools used most and *preferred* by most linemen. This list was compiled by combining linemen's selections, determined by a nationwide field survey, with the preferred tools of our own demonstrators who do all kinds of hot stick jobs.

LP is valuable to you because it helps you select tools that have *earned* their rating—tools that your line crews will really like and use. We've printed a complete listing of these tools, punched to fit your Chance Catalog. Write for your copy today.

Hot Stick Manual simplifies training live-line crews in safe practices...

Here's the manual that supervisors and safety men all over the country have been using so successfully in the training of hot stick crews. It's the most comprehensive, most authoritative guide to safe high voltage line maintenance ever published!

"Hot Sticks" has been years in the making—compiled by experts who really know hot line work. It contains 162 pages of detailed explanations—in a lineman's language—and has hundreds of how-to-do-it drawings and step-by-step diagrams that show every important operation.

Supply your live line maintenance crews with this valuable aid to safety. Price is $2.50 a copy. Every crew member should have one. Order from our General Office in Centralia, Missouri.

ABC INDUSTRIES

A·B·CHANCE CO·

CH56-21

NEW FLUORESCENT LIGHTS

Employee Reaction Rewards Co Officials

T. K. WALKONEN, Sales Technical Representative, Con Edison, New York, N. Y.

When Volkert Stampings, Inc., began moving into new quarters in Queens Village, N. Y., company officials were impressed by employee reaction to the modern lighting system that had been installed.

The new building has a total of 28 kw in lighting in its tool room, conference room, design room, kitchen, cafeteria, and two offices. Tool room illumination is 60 ft-c. It is lighted by 96-in. two-lamp, 10%-up fixtures.

"Although we always felt that our plant lighting was better than average," commented Fred Rimmler, plant manager, "we were very much surprised and greatly pleased by the vast improvement. Employees in this new section reacted so favorably that we immediately started to improve the lighting system throughout the plant. There is no doubt in our minds that better morale and better quality work will result directly."

The company now has upgraded illumination in its machine shop from 25 ft-c to about 75. The shop already was equipped with 2-lamp, 48-in. fluorescent units mounted on 10-ft centers. Supplementary lighting was used also.

As a first step in the modernization program, additional 2-lamp, 48-in. reflectors were installed between existing units in each row. This doubled illumination to 50 ft-c. In the second step, 2-lamp, 96-in. units were installed to form a grid pattern with existing fixtures. One bay, requiring eight units, has been completed. The light level now is a 75 ft-c in this bay.

GRID OF FLUORESCENT FIXTURES criss-cross beneath machine shop ceiling to give bay 75 ft-c illumination

Part of the former machine shop area, now occupied by the cost accounting department, is illuminated to 80 ft-c by four continuous rows of 4-lamp enclosed plastic bottom fluorescent units spaced about 5-ft apart. There are 16 units in this room.

Good Lighting Adds Cheer, Efficiency at Comic Book Plant

FLUORESCENT CAST 18% of their light upward to brighten ceiling, thus helping to impart an air of cheer in plant

K. L. HENRY, Industrial Sales Engineer, Connecticut Light & Power Co, Meriden, Conn.

Good lighting is helping a comic book manufacturer achieve a high quality product at low cost by making it easier for employees to see, and by making the work area appear more cheerful. Curtiss Way Co, Meriden, Conn., lights its new 47,000-sq ft, 1-story building with 540 fluorescent fixtures delivering about 40 ft-c in the working areas and 20 ft-c in storage zones.

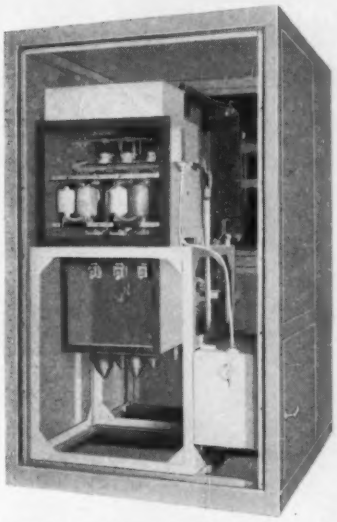
To reduce contrast between the ceiling and fixtures, two-lamp, 40-w fluorescent fixtures were chosen. They have 35-deg lateral and 45 deg transverse shielding with an 18% upward component.

By operating lights at 277 v from several banks of lighting transformers suitably situated to minimize circuit runs, the company was able to capitalize upon smaller wire and switch sizes.

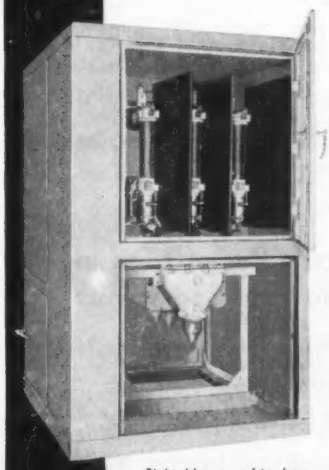
This manufacturer can publish up to 32 million comic books a month in its new plant.

G&W "UNICLAD" Primary Service Switch-Fuse Units

enclosed in metal cabinets for safety and appearance.

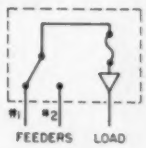


Left side panel and cover plates removed to show details of oil switch (with control transformers) and of cable terminating compartment. Also note Model "F" automatic operating mechanism. Oil switches can be furnished for full load break manual operation instead of automatic.



Right side opened to show disconnecting type power fuses and load cable pothead. The pothead can be 3 conductor as shown or 3 single conductor—or less potheads for rubber insulated cables in dry locations.

TYPE "U-SC-RAD-F" UNIT including: Feeder selector oil switch, 3 pole, 15 Kv., 400 amp. full load break; with Model "F" automatic transfer mechanism. "SC" power fuses and pothead for load connection.



G & W combination load break oil switch-fuse primary service units—in economical functional designs have been furnished for many years. They help maintain service continuity and provide load circuit protection. They have a remarkable record of trouble-free operation—with a minimum of maintenance.

The oil switches, fuses and other component parts are now factory assembled as UNICLAD metal enclosed units—which present a neat and harmonious appearance in indoor or outdoor locations. The enclosure of porcelain bushings, live lugs and connections promotes safety.

The arrangement of equipment within the UNICLAD enclosure is such that ready access is provided for termination of feeder and load cables, for maintenance of oil switches and mechanism and for replacement of fuses.

UNICLAD switch-fuse units are custom designed for practically any primary service center requirements.

Get in touch with us or our representatives for further data and prices on "Uniclad" Switch-Fuse units to meet your requirements.

G & W ELECTRIC SPECIALTY CO.
7780 Dante Avenue, Chicago 19, Illinois, U.S.A.

Representatives in principal cities of U.S.A.
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D557

KLEIN

THE THRILL THAT ONLY GOOD TOOLS CAN GIVE

"Since 1857"

It's a pleasure to use good tools —pliers that grip tight . . . that cut through tough wire easily . . . that reach confined spaces.

Linemen and electricians know that they can rely on their Kleins—side cutters, long nose, oblique cutters—famous for quality for a century.

There is a Klein Plier exactly suited to every electrical need—carried in stock by better electrical suppliers everywhere.

Write for your FREE copy of the Klein Pocket Tool Guide listing Klein equipment and giving valuable information.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
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COOS BAY LUMBER DOCK is lighted by 12 mercury vapor units that maintain a 1.22 ft-c average on the dock, making it easier for employees to work safely

Mercury Vapor Dock Lights Cut Costs

DONALD C. STATHAM, Commercial Sales, Pacific Power & Light Co, Coos Bay, Ore.

Mercury vapor lights enable Pierce Lumber Co, Coos Bay, Ore., to load ships at night. The lights have cut operating costs by overcoming the difficulties of finding "lots," by reducing hazards of night operations, by raising efficiency of personnel, and by making working conditions easier.

The new dock area is studded with 12 luminaires equipped with Type IV glassware. Mounted 40 ft high on cedar poles, the lamps operate in pairs served by a two-lamp ballast protected by a weatherproof metal case. Two poles are switched at a time. All wiring is underground to eliminate hazards to hoisting equipment that otherwise might strike overhead conductors.

Selected for its long lamp life and high light output, this 4.8-kw mercury vapor multiple system, operating at 120 v, maintains an average of 1.22 ft-c on the dock. Luminaires are rated at 20,000 lumens initially and 16,200 lumens mean. The system is used about 50% of the time at night.

Since its completion, lumber company officials have expressed satisfaction with it, and longshoremen and dock workers agree that the lights have helped make their work easier. Coos Bay is the largest lumber shipping port in the world. About 660,000,000 board ft were shipped from it last year.

Electric Heater Used in Extracting Food Flavors

ERNEST L. HUSE, Division Sales Manager, Jersey Central Power & Light Co, Asbury Park, N. J.

Extracts of food flavorings are prepared at Norda Essential Oil & Chemical Co, Boonton, N. J., with what is believed a unique electric heating installation. A 650-kw, 440-v heater warms air before it is introduced into an 18-ft cylinder 30 ft high. The flavoring extracts emerge as tiny nodules to be used in the preparation of foods and drinks, and are chemically pure. A high temperature is obtained without the hazards of a flame type of heat. In contrast, the conventional method used—by makers of instant coffee for instance —involves a gas, kerosene, or oil fire with a large volume of excess air.

You needn't go it alone

in solving EHV Problems...

Where do you go for guidance when planning an extra-high voltage transmission line or some other pioneer-type project?

Usually, experience of other builders of EHV lines is limited, and may not apply to your problems.

At this point O-B often can be helpful. Answers not available in practice can be found or have been found in the laboratory. In the O-B laboratory, high voltage research has been going on for almost half a century. From test results we've built an important fund of knowledge, and we've developed the ability to interpret those results in terms useful to you.

Then there is a management attitude that encourages exploration of new electrical frontiers. For example, decades before today's extra-high voltage lines were built, EHV was being studied in the Barberton laboratory. Today O-B insulators and hardware are in service on every EHV line in North America.

That's why coming to O-B often gives you a head start in solving your problems. Maybe we already have the answers. If we don't, we're always ready to help in working out problems of mutual interest. There's no need to go it alone in solving EHV or other special problems.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Ohio Brass

"THEY SAID IT COULDN'T HAPPEN" Even with a shunt connected in parallel, insulators flash over in Barberton laboratory when simulated direct lightning stroke is applied. With information gathered in such tests, a new and more comprehensive understanding of tower flashover can be developed.

TO CATCH THE ONE THAT NEEDS IT WE TREAT THE WHOLE 100...

Our technical director says, "99 out of 100 castings probably don't need it, but to make sure we catch the one that does, we treat them all."

He's talking about the special processing of O-B malleable iron to provide maximum impact strength.

Every malleable fitting—clamp, socket eye, yoke, shackle, hook, suspension insulator cap—receives the patented Flecto treatment, or comparable treatment in the electric anneal furnaces.

Flecto, a special heat treatment after annealing, prevents embrittlement during galvanizing. Thus O-B malleable hardware will have maximum resistance to such shock loads as develop when ice suddenly lets loose or a conductor starts to gallop.

Our experience indicates that probably only one casting in a 100 will ever get such a load. But who knows which one it will be? To make sure they're all right, we treat the whole 100.

Concern over what might happen and the ability to counteract it in advance—even if it's only a 1 in a 100 possibility—are typical of the Technical Competence idea that permeates the O-B organization. You can't always see Technical Competence. But if the product—insulator or hardware—carries the O-B trademark, you know it's there . . . because Technical Competence is the heart of every O-B product!

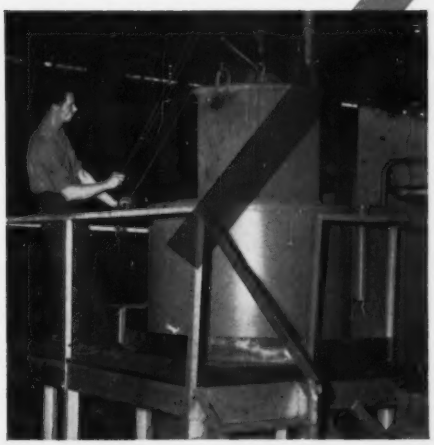
the heart of all *Ohio Brass* hardware

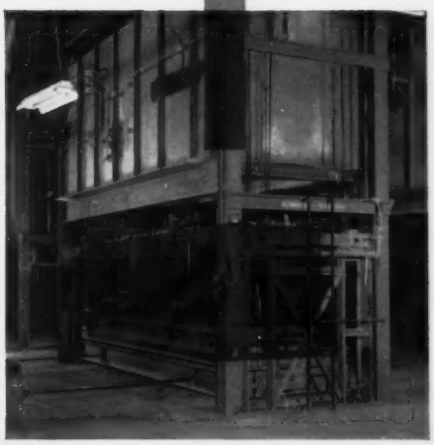
Baskets of insulator caps are loaded for annealing in electric furnaces. Complete malleabilizing cycle takes 48 hours in eight-ton furnaces.

This instrument panel controls the temperature in the annealing furnaces. A key part of the cooling process is holding iron at the critical temperature for an extended period as the internal structure of the iron changes.

Malleable iron castings that are annealed in coal-fired furnaces are later Flecto-treated in special furnace to protect against embrittlement.

Load-changing time for annealing furnaces. Red-hot baskets of insulator caps have been lowered from first furnace, now go to another furnace for second half of annealing cycle. Special care is taken to avoid subsequent embrittlement of iron during galvanizing.





This "Fantasy" may be closer than you think

Is Your Distribution System Ready?

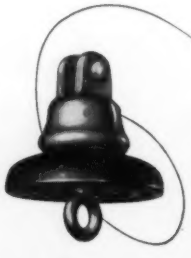
Is the idea of an all-electric home really so fantastic? It's possible right now to install economical electric space heating, entire walls that light up and ceilings that begin to glow automatically as the sun goes down, and television systems that help mother baby sit without running all over the house. The next step probably should be an electric paddle to help enforce discipline by remote control.

A key to the rate of residential load growth is the capacity of the distribution system. That's why many farsighted companies are constantly rebuilding dead-ends . . . to get ready now for the higher voltages that are sure to be needed.

Your local Graybar house is ready to work with you. It has the O-B insulators and hardware needed for a forward-looking program, one that calls for as many as three six-inch suspensions at every deadend. Saving you the trouble of maintaining large warehouse inventories, Graybar can be an important ally in the race to stay ahead of rising residential loads. You can depend on Graybar to have O-B materials available when and where you need them.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass



*GraybaR QUALITY SINCE 1869 *REG. U.S. PAT. OFF. Distributed by *GraybaR ELECTRIC COMPANY

4675-H

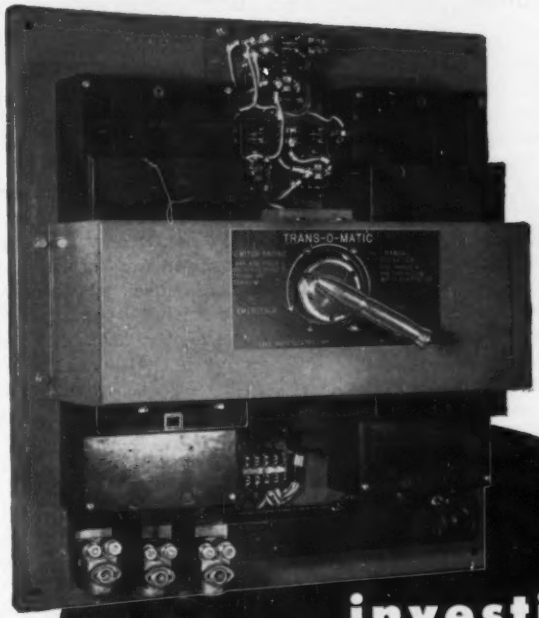
INDUSTRIAL BRIEFS

Washing trucks and automobiles at Utah Power & Light Co's Salt Lake Division of Lines & Service department is made easier, more comfortable and more efficient by a 4-kw, 88-gal water heater. Hot water is mixed by a thermostatically controlled valve with water from the city mains to raise its temperature from 50F to 70F. In winter, this makes washing easier by permitting quicker flushing off of snow and ice. Grease spots and other deposits also vanish more quickly, and the final washing job is superior to that formerly done with 50F water. Now one employee can wash about 15 vehicles per shift. Formerly he could wash only eight cars per shift. Darcie H. White, Supervisor, Business Development Department, Utah Power & Light Co, Salt Lake City, Utah.

Producing plastic shoe counters rapidly at Brockton (Mass.) Cut Sole Corp is achieved now by electrically heated injection molding machines. Electrically powered, these machines can automatically produce four to five pairs of counters a minute. Polyethylene pellets fed from a hopper are heated to 350F or 450F by 110-v coils and rammed into the mold at 1,000 psi, driven by a 15-hp, 220-v 3-phase, motor-operated hydraulic pump. Production is on a 24-hr basis. Energy consumed on a one-machine shift tested at 10 kwhr. Maximum demand is 28 kw. The finished counter is impervious to moisture, uniform, non-shrinkable and non-expandible and is superior in strength. Because of the success attained with this method, a second machine has been added.

Baking motor stators in a 4½ x 6 x 6-ft "walk-in" oven has helped Reeves-Hoffman Corp, Carlisle, Pa., upgrade specifications on blendor motors. Formerly a thermo-setting tape was the only insulation between coil and stator core laminations. New specs called for a varnish impregation of the stator to raise maximum safe operating temperature of the motor and to yield better protection against tropical humidity. The stators now bake in the 38-kw oven for 6 hr at 290F. Joe Mumma, Industrial Representatives, Pennsylvania Power & Light Co, Harrisburg, Pa.

if YOU'RE responsible for POWER CONTINUITY



TOTAL FAILURE PROTECTION

PARTIAL VOLTAGE FAILURE PROTECTION

POSITIVE NORMAL OR EMERGENCY POSITIONS ONLY

investigate
TRANS-O-MATIC
AUTOMATIC TRANSFER SWITCHES

Trans-O-Matic's compact, failure-proof design employs two standard circuit breakers, one from the normal and one from the emergency source, either of which will supply the load. Relay-actuated motor operates circuit breakers for positive mechanical transfer with continuous service in normal or emergency position. Available in capacities to 600 volts, 800 amps, interrupting capacities to 50,000 amps RMS. Prompt delivery in most sizes.

OPTIONAL FEATURES

Adjustable time delay on restoration to 20 minutes • Engine starting contact • Test pushbutton • Pilot lights for switch position • Special enclosures

LAKE SHORE Electric CORPORATION
BEDFORD, OHIO

Niagara Mohawk Sets Heating Push

Promotion features budget plan, testimonials in aim for greater public education. Manufacturers, distributors adopt standard estimating form.

Niagara Mohawk Power Corp, Western Division, announced plans late last month for a house heating promotion at a meeting of trade allies. Using a "Switch from Fire to Wire" theme, the program will take place in eight counties of the division's western New York area. The aim: Increasing customer acceptance and trade ally cooperation.

Niagara officials told representatives of 10 large manufacturers and distributors the promotion will hinge on a budget plan for electric bills and a testimonial-type booklet. The prospects, said P. W. Evans, residential sales manager, include all of the division's 355,000 urban and rural customers who are interested in heating electrically.

The budget plan has already been offered the 500 or so house heating customers in the division. The proposal for a 12-month spread of equal bill payments will go to "each new customer . . . as soon as we are notified that home is to be heated electrically," said Evans.

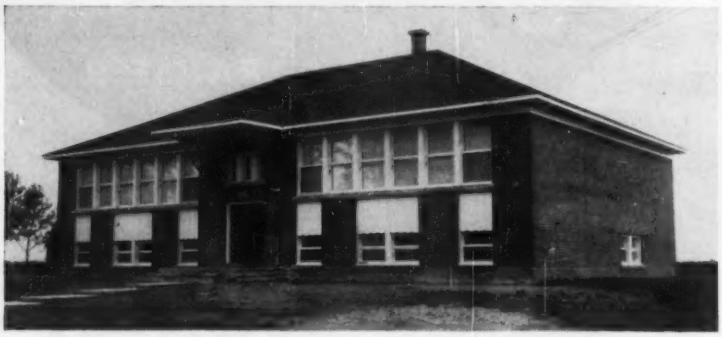
The booklet convincingly promotes convenience and economy angles. It describes 10 homes of various sizes, their room dimensions, insulation, kw electric heat installed, total consumption and annual bill. Example: "In addition to electric heat, the Prince family enjoys an electric clothes dryer, an electric range, refrigerator, water heater, home freezer and TV. Yet the bill for all this electric living comes to only $381 a year, less than $32 a month."

This booklet will be offered to distributors for mailing to the trade and sent to customers inquiring about electric heating.

The division has purchased the sound slide film on house heating produced by National Electrical Manufacturers Association. They will also use NEMA's installation design manual, with some additions on budget payment details, and probably distribute the association's consumer booklets.

Before the meeting adjourned, trade allies agreed that Niagara's Electric Home Heating Calculation Data form would help the industry doing business in the area. These will be sent to firms by Niagara's Western Division and "will be furnished to the individuals responsible for calculating and estimating," Evans said.

The day after the meeting, the utility held a basic training sales course for 50 of its customer contact employees. Its objective was to acquaint employees with the calculating and estimating of house heating jobs.



Electricity Cuts Hooky, Heat Costs

When two schools in the uppermost inhabited areas of the Province of Quebec switched to electric heat, school administrators, the kids and taxpayers all came out ahead. The school above, built at Notre Dame du Rosaire high up the Peribonka River, achieved a 90% cut in absenteeism by replacing wood-fired stoves. The area regularly records more than 14,000 deg days.

About 90 miles away at Labrecque, St. Leon in Chicoutimi County, two schools of the same type construction and size compared lighting and heat costs. The one using electricity cost $821.85. Bills for the neighboring oil-fired school totaled $949.90—not including the tab for maintenance and service by the janitor.

Builder Buys $¼ Million 'Perimeter' Cooling Units

Hallmark Construction Corp, a New Jersey firm, has purchased 1,060 built-in wall air conditioners for its 265-home, East Brunswick project which opened in June. The order, obtained by Lewyt Air Conditioner Corp, Long Island City, N. Y., totals about $250,000.

The 'perimeter' units, in capacities up to one ton, will be proportioned according to house size and exposure to sun. Harry Sherman, Hallmark president, said the order was "mandatory in these modern and competitive times. The seven and eight room houses will range from $16,000 to $17,500.

A.C. Gets Thinner

"World's slimmest" is what Emerson Radio & Phonograph Corp calls its new 15-in. deep room air conditioner.

the New Importance of the RLM Label III

Send for Your Complimentary Copy of this 1956 Edition RLM Specifications Book

NOW MORE USEFUL THAN EVER!

New illumination data and complete up-to-dating of specifications for 36 different RLM industrial lighting units, make this new RLM Book more useful than ever to buyers, sellers and specifiers of industrial lighting equipment. An important change concerns the use—for the first time in RLM Specifications—of the Zonal Method of computing Coefficients of Utilization and illumination on room surfaces. The tables printed in this new edition are based on this method. You'll also find helpful light distribution curves on both incandescent and fluorescent equipment, including the new Semi-Direct fluorescent units, which direct 20% to 30% of the light upward. In addition, there are important changes in the RLM Standard Specifications covering materials, construction and photometric performance.

If your work is at all concerned with industrial lighting equipment, make sure you have this latest edition RLM Specifications Book—you'll recognize it by its green cover with the big red-and-black RLM Label. For your complimentary copy, write to the Institute, or use the coupon.

RLM STANDARDS INSTITUTE
INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

R-1347

RLM Standards Institute, Suite 821
326 W. Madison St., Chicago 6, Ill.

Please send me a copy of the new 1956 RLM Book. I understand there is no cost or obligation.

Name and title_____

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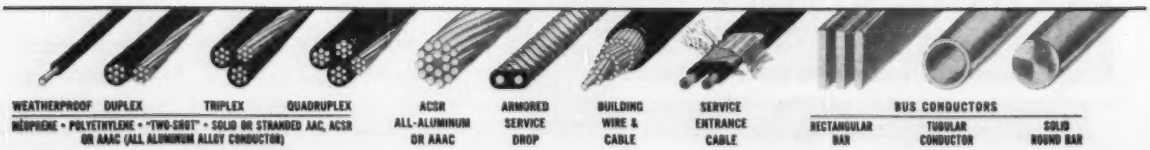


WEATHERPROOF DUPLEX TRIPLEX QUADRUPLEX

NEOPRENE • POLYETHYLENE • "TWO-SHOT" • SOLID OR STRANDED AAC, ACSR OR AAAC (ALL ALUMINUM ALLOY CONDUCTOR)

ACSR ALL-ALUMINUM OR AAAC

ARMORED SERVICE DROP

BUILDING WIRE & CABLE

SERVICE ENTRANCE CABLE

BUS CONDUCTORS

RECTANGULAR BAR

TUBULAR CONDUCTOR

SOLID ROUND BAR

Two great names in aluminum bus conductor

BULLDOG began pioneering work in the use of aluminum bus bars nearly ten years ago. Today, BullDog BUStribution Duct Systems—manufactured with Kaiser Aluminum bus bars—provide many advantages for users of secondary electrical distribution.

Interchangeability—BullDog aluminum duct systems are completely interchangeable with existing BullDog copper duct installations and eliminate the necessity for duplicate parts and accessories.

Light weight, low cost—Aluminum bus bars are one-third the weight of copper by volume. Aluminum bars weigh as much as 40% less than copper bars in certain sizes. Thus original cost is lower. And additional savings in installation are realized, because aluminum bus duct systems are easier to handle, easier to lift, easier to move into position.

5-Step Silvering Process—To insure consistent conductivity along the entire length of the system, BullDog gives all contact surfaces a 5-step silvering process. All surfaces are 1) cleaned, 2) zinc coated, 3) copper flashed, 4) copper coated, 5) silvered to provide maximum conductivity.

Detailed information on BullDog BUStribution Duct Systems can be obtained by writing to BullDog Electrict Products Company, 7610 Jos Campau, Detroit 11, Michigan.

* * *

Aluminum's unique combination of useful advantages make Kaiser Aluminum Bus Conductor ideal for use in industrial plants, commercial buildings, central stations and substations. Among its advantages are high conductivity, light weight, corrosion resistance, workability, strength, availability and economy.

To aid manufacturers, utilities, architects and engineers converting to aluminum bus, Kaiser Aluminum makes available a large range of shapes, alloys and sizes of aluminum bus conductor—including rectangular, tubular, and solid round bus.

Ask for free booklet "Kaiser Aluminum Bus Conductors"—containing valuable information on types and advantages, availability, electrical properties, physical properties, bending, corrosion resistance, joining, and silver plating.

Call or write any Kaiser Aluminum sales office. Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

Analyzer Board Simplifies Heat Pump Course

Homemade electrical sequence panel helps Carolina Power & Light Co man teach and students learn details and operation of GE Weathertron

CLIFTON SMITH, Division Appliance Service Coordinator, Carolina Power & Light Co, Florence, S. C.

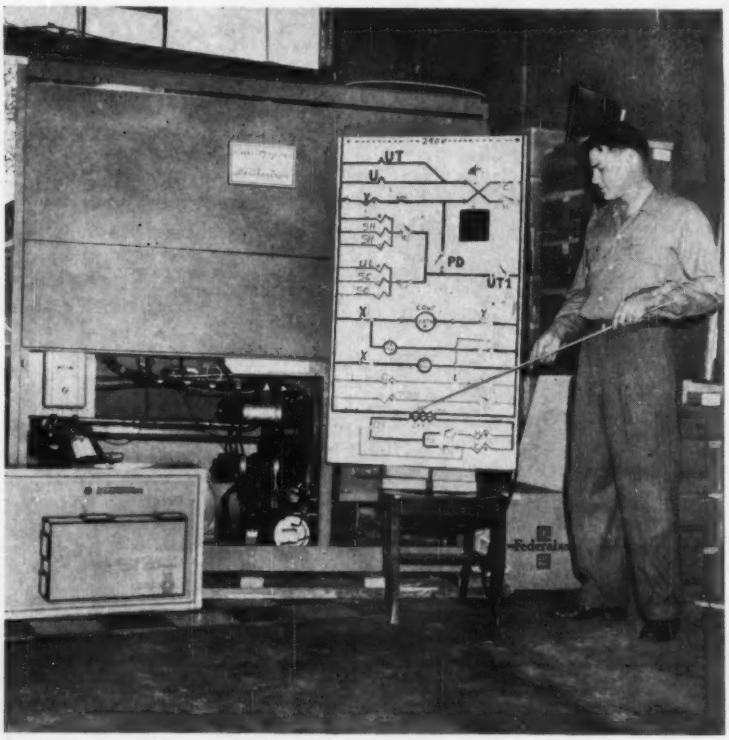
An electrical sequence board, devised for heat pump schools held by Carolina Power & Light Co, serves as a valuable instruction tool for the author. Its movable contacts, colored circuits, and lights give the students a "see and do" learning situation which makes instruction easier and more interesting.

The board, shown in the photograph below, has a dual purpose. It is used as an instructor's aid in teaching circuits and sequence operations of GE's YR30 and YR50 heat pumps. Operation of various relays, solenoids, etc., can be simulated for any step of each cycle. Electrical progression from cooling to heating, heating to cooling, or heating to defrost can be clearly demonstrated.

Its other use is to study service problems whether real or simulated. They can be put on the board and analyzed. The results of any foul-up can be readily seen or traced.

A similar board could be built and used to simplify explanations of any device where several relays, solenoids, and controls operate simultaneously or in certain sequences. The board slows down the operation to a step-to-step procedure. Students can take their time to analyze each step and its resulting effects on other parts of the system.

Essentially, the pictured board is a schematic wiring diagram of a single phase YR50 heat pump painted on a 26 x 48 in. cardboard panel. The back is wired to correspond to the diagram and is served by a low voltage transformer. On a three phase unit, the only difference would be the third wire to the compressor motor.



THE AUTHOR, originator of this Weathertron analyzer board, uses it to simplify his explanation of complex heat pump operation, servicing, and installation

Colored Lights Help Students

A few changes were made on the panel, especially on the latching relay device, to simplify instructions. Small improvised switches are used to show moving contacts of relays and controls. A big help to students was special colors for each circuit and its components; red for heating, blue for cooling, and green for defrost. Appropriately colored light bulbs are installed near or within symbols representing various devices. Bulbs for the fans and compressor motor are white.

Bulb Sizes Are Functional

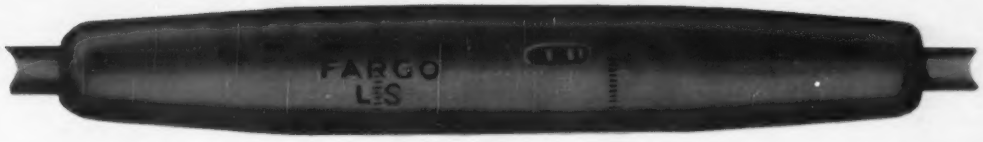
As another aid, two bulb sizes are used; small ones to represent solenoids and fan motors, large ones for devices that move contacts. When a large bulb flicks off or on, the student knows he has "contacts" to move. A large bulb for the compressor motor is needed since the compressor causes the contacts of the pressure differential and defrost cut-out pressure switches to operate.

Better Than Thousand Words

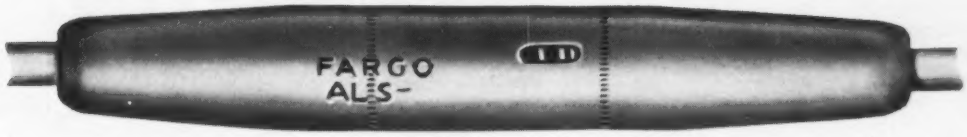
The idea for the board developed after the author's one-week session at GE's Weathertronics Institute at Bloomfield, N. J. In passing along the training to other service coordinators and dealer personnel, it soon became apparent that a visual aid would help. After some experimentation, the present electrical sequence board was completed. By going a step farther than the old saying, "One picture is worth a thousand words," the board has resulted in a better understanding of a complex subject.

(*More Sales and Service on page* 140)

Who says you can't save splicing time?



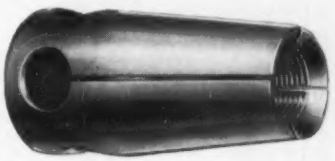
LS Series — for straight line splicing



ALS Series — for straight line splicing
Aluminum NDLS Series — for straight line splicing — AAAC

ONE-PIECE JAW SIMPLY
CANNOT
GET OUT OF ALIGNMENT

Every Fargo Automatic Line Splice has this exclusive one-piece jaw which, unlike multiple-part jaws, cannot get out of alignment. For copper splices, jaws are machined from solid bar stock . . . for aluminum and AAAC splices, from special aluminum alloys.



Ask your line Material Field Engineer for complete details.

THERE ARE NO IFS, ANDS, OR BUTS about it . . . you cut splicing time to rock bottom with Fargo Automatic Line Splices for aluminum and copper. These unique line splices are really *automatic.* No tools are needed . . . the one-piece jaw has ample safety zone to accommodate burred ends of wire and assure full surface grip on conductors . . . sag guide removes the guesswork from sagging lines properly . . . linemen make installations in a jiffy; work of the entire crew is eased and speeded.

On top of this, in Fargo Automatic Line Splices all parts have equal or superior weather-ability to the conductors . . . connections develop the full strength of the wires . . . provide joint resistance lower than an equal length of the conductor.

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie
New York

FARGO

Distributed by
LINE MATERIAL COMPANY
(A McGraw Electric Company Division)
Milwaukee, Wisconsin
In Canada, CANADIAN LINE MATERIALS, LTD., Toronto, Canada

New Lights—Business Up 40%

"The best money I ever spent," says Druggist E. E. Yeo about the new lighting job in his pharmacy at Gladstone, Ore. And small wonder. Yeo credits the lighting with contributing most to the 40% jump in business he has had since modernizing his store. While most of his business over the past 20 years has been the one-shot, emergency type, regular customers now comprise the bulk of his trade; and business, he says, is getting better every month.

The store measures 28 ft 9 in. x 44 ft with a 12 ft ceiling. It is lighted by 18 deluxe cool fluorescent lamps mounted in fixtures with low-surface-brightness plastic bottoms. In the main merchandising area, eight 8-ft 4-lamp, T-12 fixtures were installed in two rows on 9-ft 6-in. centers. Two more fixtures flank the prescription area. Reading after 2,000 hr showed an overall average of 70 ft-c. The 10x20-ft prescription section (background at right) has a solid installation of eight 8-ft 2-lamp T-12 fixtures. Readings of 110 ft-c were taken after 2,000 hr of burning. Most of the light from the fixtures is usable because of highly reflective surfaces in the store. Owner Yeo's first intention was to install less expensive bare tube lighting but after discussion decided on the better quality lighting.—Del A. Maulding, Lighting Specialist, Portland General Electric Co, Portland, Ore.

S & S SHORTS

Selling Points for Barn Cleaner

A barn cleaner can save 12 full working days a year for a dairy farmer with a 20-cow herd, reports the University of Wisconsin College of Agriculture. It says a cleaner, on the average, will save five hr per cow annually, "besides getting rid of some of the farmer's most back-breaking work."

Shorties:

Ceramic radiant heat panels suspended from ceilings is new Heatmore, Inc, product aimed for commercial and industrial use, or wherever wall, floor space is at premium . . . Electronic timing device for dryers, made by El-Tronics, Inc, Mayfield, Pa., measures desired drying period for each load, then shuts off.

Offers Water Heater Incentives

In four-week "Hit It Rich" water heater campaign, Pennsylvania Power & Light Co offers dealer salesmen bonus of $2.50 for first sale, $5 for the second, and $7.50 for the third and each succeeding sale. PP&L is backing it up with newspaper and billboard ads, window displays, its wire-on-time plan, and free "mobile" displays for dealers.

(*More S & S Shorts on page* 143)

ADVERTISEMENT

Advance Transformer Offers World's Most Complete Line of Quality Fluorescent Lamp Ballasts

Through outstanding engineering developments and modern manufacturing facilities, ADVANCE TRANSFORMER COMPANY has become the world's largest manufacturer devoted exclusively to the production of quality fluorescent lamp ballasts. These precision built, power regulating instruments supply exacting amounts of electrical energy for the efficient operation of all fluorescent lamps and are aptly called "THE HEART OF THE LIGHTING INDUSTRY."

Continuing research and constant new developments in both engineering and manufacturing divisions have made possible the introduction of many new ballasts with exclusive patented features. Thus, ADVANCE provides lighting equipment manufacturers, designers, architects, engineers, contractors and other fluorescent lamp ballast users the world's most extensive line of fluorescent lamp ballasts. When you use ADVANCE, there is a ballast for every specific purpose, never a need to compromise.

ADVANCE ballasts are listed by Underwriters' Laboratories, Inc., meet the Canadian Standards Association requirements and many meet or exceed Certified Ballast Manufacturers' specifications. Specify ADVANCE to be sure to get the ballasts with the "plus factors" that have built the world's largest company devoted exclusively to the manufacture of fluorescent lamp ballasts.

The Advance Transformer Company will replace, at no charge, any ADVANCE fluorescent lamp ballast which becomes inoperative within two years from date of manufacture, provided the conditions of ballast operation have conformed to the company's recommendations and the inoperative ballast is returned to an authorized ADVANCE Service-Stocking Distributor.

For anyone who manufactures, specifies, installs or uses fluorescent lighting, ADVANCE TRANSFORMER COMPANY has prepared helpful literature which they will gladly send without cost or obligation.

Fluorescent Lamp Ballast Buyer's Guide

This eight-page brochure gives data on the world's most complete line of Fluorescent Lamp Ballasts. It includes specifications, wattage, watt loss, circuit voltage, dimensions, weight, etc. This brochure is an invaluable aid for specifiers and users of fluorescent lamp ballasts.

Fluorescent Lamp Ballast Cross Reference Guide

This helpful guide lists many popular ballasts by catalog number and the ADVANCE ballast that should be used whenever ballast replacement becomes necessary. It is an invaluable reference chart that saves time and money for all users of fluorescent lamp ballasts.

Service-Stocking Distributor Plan and List of Distributors

This is a six-page color brochure that lists, by city and state, more than 550 distributors who carry a stock of ADVANCE Fluorescent Lamp Ballasts, to provide immediate replacement service for *ballasts of any make* that become inoperative.

You may receive a copy of one or all of these brochures by contacting ADVANCE TRANSFORMER COMPANY, Marketing Division, 2950 North Western Avenue, Chicago 18, Illinois.

World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

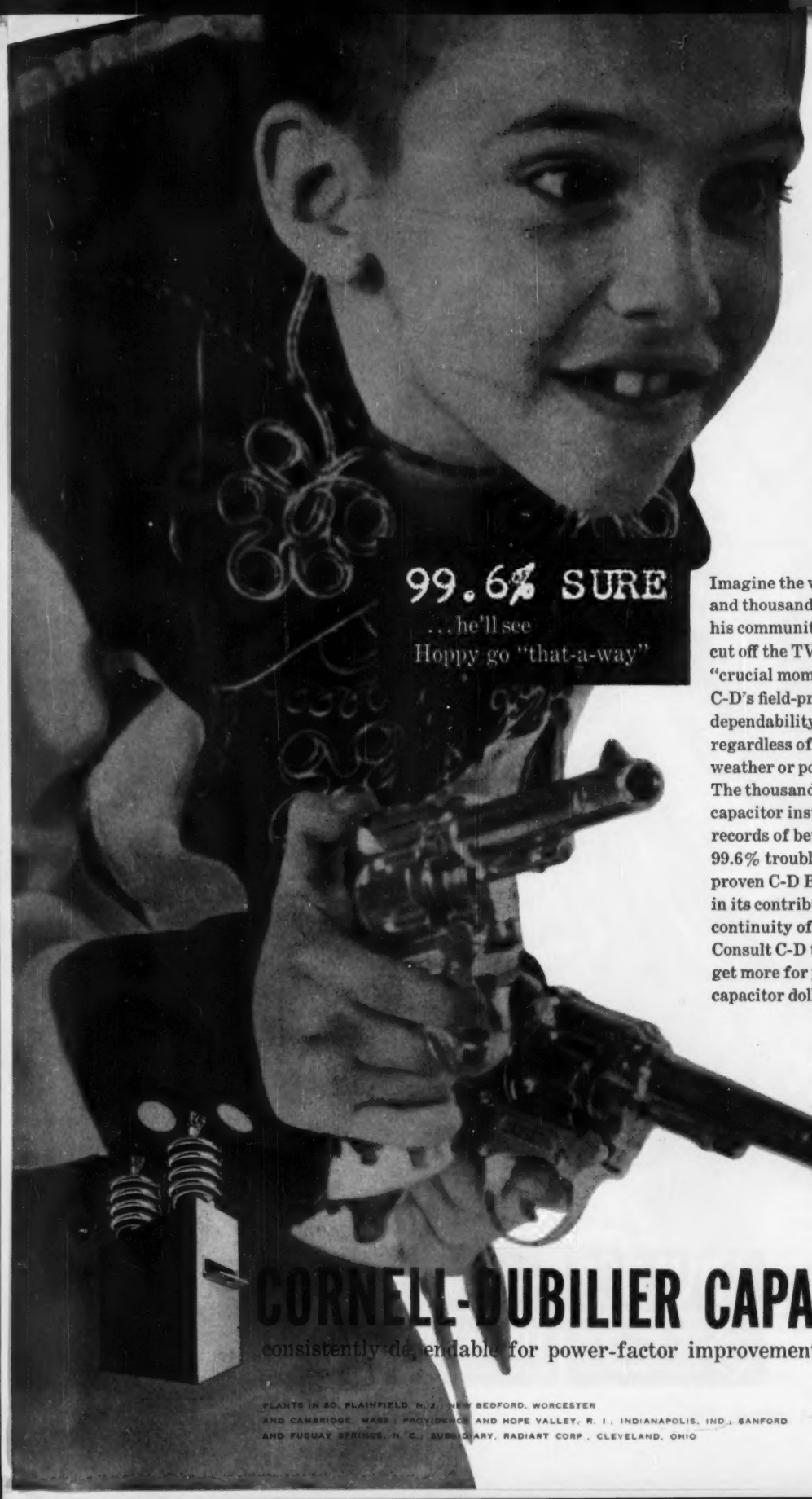
ADVANCE

CBM CERTIFIED by FTI

World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

TRANSFORMER CO.

2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.



Imagine the wrath of this boy . . . and thousands of others in his community . . . if power outages cut off the TV at the "crucial moment". That's where C-D's field-proved dependability pays off . . . regardless of changing weather or power load conditions. The thousands of C-D power capacitor installations . . . all with records of better than 99.6% trouble-free service . . . have proven C-D BEST BY FIELD TEST in its contribution to the high continuity of utility service. Consult C-D to learn how you can get more for your capacitor dollars with C-D.

CORNELL-DUBILIER CAPACITORS

consistently dependable for power-factor improvement

PLANTS IN SO. PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS.; PROVIDENCE AND HOPE VALLEY, R. I.; INDIANAPOLIS, IND.; SANFORD AND FUQUAY SPRINGS, N. C.; SUBSIDIARY, RADIART CORP., CLEVELAND, OHIO

CORNELL-DUBILIER power-factor capacitors give you better than 99.6% trouble-free service*

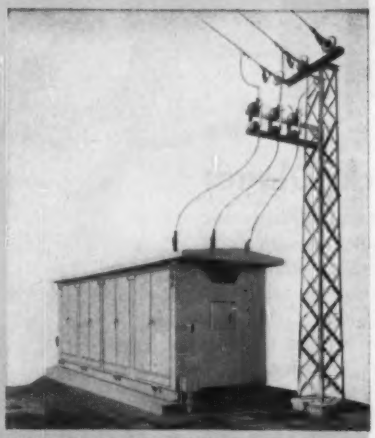
Low dielectric unit stress provides an extra margin of safety that results in the ability to withstand higher transient voltages. When you buy C-D, you buy premium quality at no extra cost.

Extra strength wet process two piece porcelain terminals . . . one of the many important reasons why C-D capacitors can point to year after year of trouble-free service in coastal areas.

Another evidence of C-D's premium quality power capacitor service . . . at no extra cost . . . is the fact that C-D has no "Return Material Department". Most repairs are of such a minor nature that they are handled on an individual basis. This results in a prompt, personalized service impossible where the safety factor has been cut in favor of production, weight and size economies.

C-D's rack capacitors are shipped completely assembled ready for energization. Again C-D's conservative engineering standards provide the structural strength to do this and as a result save the utility time, assembly and installation costs in the field.

Why is it that only C-D power capacitors give you assurance of complete dependability?... because C-D's built-in safety factor results from the ultimate in tried and proven design levels coupled with conservative production techniques and rigorous quality control. For catalog write to Cornell-Dubilier Electric Corporation, South Plainfield, N. J.



Part of a 37,000 KVAR C-D installation at substations of a large Western company.

***This is an average based on reports from leading utilities using C-D capacitors. Many of these reports have shown 100% trouble-free service, and none lower than 98.0%.**

S & S SHORTS

(*Continued from page* 140)

Projector Lamp Code Ok'd

A code to designate, identify lamps for projectors and other photo equipment has won approval of American Standards Association. Lamp identification will include 1) a symbol designating lamp type composed of 2) three letters of the alphabet, except I, Q, O, with 3) wattage, voltage and burning system indicated at manufacturer's discretion. The system will be administered through the association. Code will appear on cartons, lamps within next few months.

Ranges, Heaters Subsidized

Tacoma City Light pays up to $50 toward the cost of installing new services for both ranges and heaters in new campaign now underway. Assistance includes $20 for the replacement of a fuel-type or old side-arm water heater with an automatic electric heater. It also provides $20 toward the cost of installation on ranges which replace any fuel-burning units.

Bulbs That Twinkle?

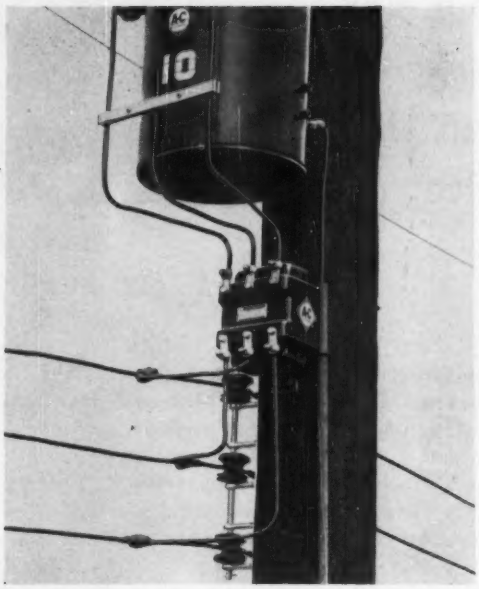
New Twinkle Lamp with firefly effect will be marketed by General Electric Co for Christmas, subsequent holidays. Designed for transformer-operated string sets permitting multiple burning, bulb comes in four colors, operates on principle like home bimetal thermostats.

How to Break Bottlenecks

American housewife will buy more frozen foods in almost exact proportion to the amount displayed to her in refrigerated cabinets. This is view of F. G. Coggin, Detroit Controls Co, Detroit, Mich. "The bottleneck in frozen food sales is principally at the retail level," he said recently, "and when the food retailer makes adequate provision for displaying frozen foods, sales and profits will soar."

Pocket TV Next?

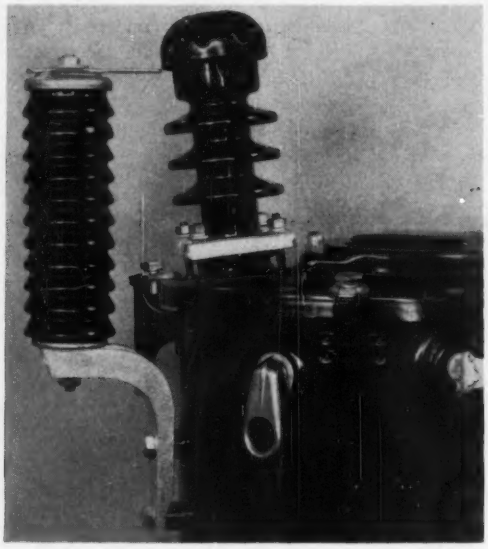
General Electric Co says its 14-in. portable TV set, introduced one year ago, accounts for 5% of all set sales. The announcement came with introduction of two other portables: a 9-in. 13-lb model to retail at about $100 and a 17-in. 32 lb series selling for $149.



Buck-Boost Autotransformer

Designed for utilities using no-tap transformers on their distribution systems, this autotransformer will be available in sizes below 50 kva. Bucking or boosting capacity will be approximately 5%, manufacturer claims. It is also designed for adjusting voltage ratio of distribution transformers from one voltage to another.

Molded in epoxy resin and fitted with electro tin-plated clamp connectors, the autotransformer is described as relatively light (15-kva unit is about 35 lb).
Allis-Chalmers Mfg Co, Milwaukee 1, Wis.



H-V Bushing

A h-v bushing for distribution transformers rated above 5 kv features a hand-grip connector. The rubber insulated connector reportedly provides protection against service interruptions caused by birds and animals coming in contact with live parts.

Manufacturer claims connector allows line installation without use of tools. Bushing is available for conventional transformers and CSP (left photo).
Kuhlman Electric Co, Bay City, Mich.

Hydraulic Derrick, Digger

Designed for front and rear operation, hydraulic derrick and digger reportedly handle poles up to 55 ft. A single, double-acting hydraulic cylinder with built-in safety valve provides control for raising or lowering derrick.

Hydraulic or mechanical digger may be attached to derrick and, for reaches above or below truck, digger may be suspended from winch line. By lowering below normal horizontal work position, hydraulic digger is said to "borrow" truck's weight for frozen soil or hard pan conditions.
Tel-E-Lect Products, Inc, 10093 Minnetonka Blvd, Minneapolis 26, Minn.

(*More New Equipment on page* 146)

Shoot FOR ECONOMY AND TOP PERFORMANCE

Andersons' PISTOL GRIP

TYPE "PG" ALUMINUM DEAD END CLAMP

*** HIGH holding power!**

Ideal for long span distribution and sub-transmission.

A new quadrant type dead end clamp that more completely meets all the requirements for proper handling of aluminum and ASCR cable on distribution and sub-transmission systems!

- **LIGHT WEIGHT** . . . to reduce cable damage!
- **HIGH STRENGTH** . . . over and above ratings of cables and insulators normally used!
- **ONE-PIECE KEEPER ASSEMBLY** . . . for quicker, simpler installation!
- **FLARED MOUTH** . . . to reduce chafing and vibration damage!
- **CORROSION RESISTANCE** . . . silicon bearing #356 aluminum alloy.

3 SIZES FOR COMPLETE RANGE . . . recommended for all-aluminum and ACSR cable. No liners required.

For more complete information consult your nearest **ANDERSON** *representative*

Aluminum & Bronze **POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES for SUBSTATION • TRANSMISSION • DISTRIBUTION**

ADEQUATE WIRING SERVES AND SAVES

ANDERSON ELECTRIC

CORPORATION

P. O. DRAWER 2151 • BIRMINGHAM 1, ALABAMA

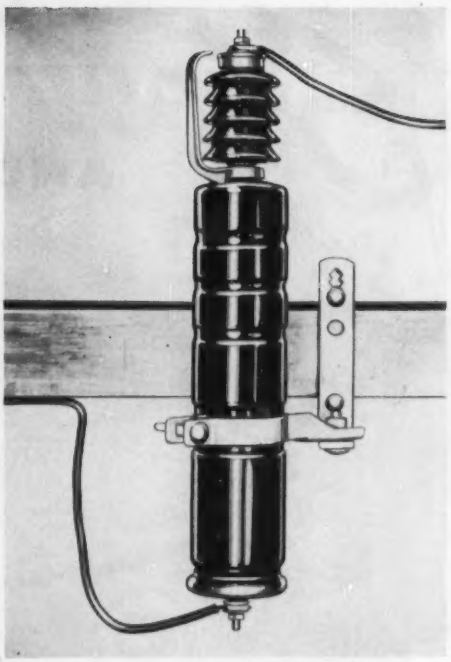
Formerly Anderson Brass Works, Inc.

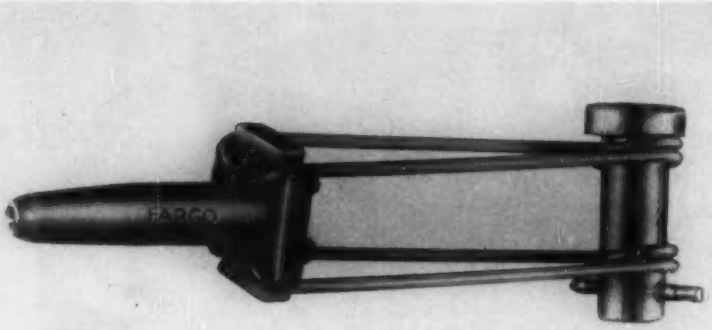
Open Gap Valve Arrester

T-type open gap valve arrester for crossarm installation is available in 3, 6, 9, and 10-kv ratings. Features are low impulse sparkover and IR drop, limiting of 60-cycle follow current, positive interruption of follow current and high discharge capacity, manufacturer claims.

Each arrester has an external isolating gap in series with a porcelain-housed multi-gap assembly and valve element. Primary connector is tin plated to accommodate copper or aluminum primary conductors. Ground connector is said to facilitate interconnection with system neutrals.

Line Material Co, 700 W. Michigan St, Milwaukee, Wis.





Double Bail Deadend

Sizes and types of this double bail deadend reportedly handle copper or aluminum conductors from No. 6 solid through 250 Mcm. It features a "one-piece" gripping jaw whose internal sleeve guides conductor through the spring.

Ends of the stainless steel bails are formed so gripping unit is retained in bronze yoke.

Fargo Mfg Co, Poughkeepsie, N. Y.

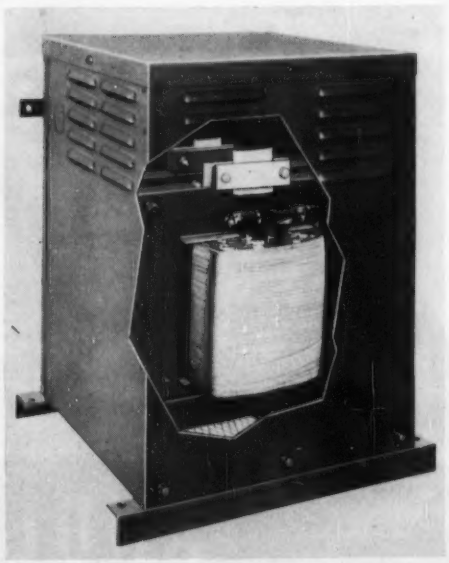
Single-Phase Transformer

Line of single-phase power and lighting transformers includes 28 standard sizes from 50 va to 500 kva. They have dual primary and dual secondary windings, and can also be used for 240-v, 3-wire service, maker reports.

Designed for optimum copper to core loss ratio, transformer reportedly features quiet operation and use of silicon steel. Removable top cover, marked terminal leads and diagramatic nameplate are said to aid installation.

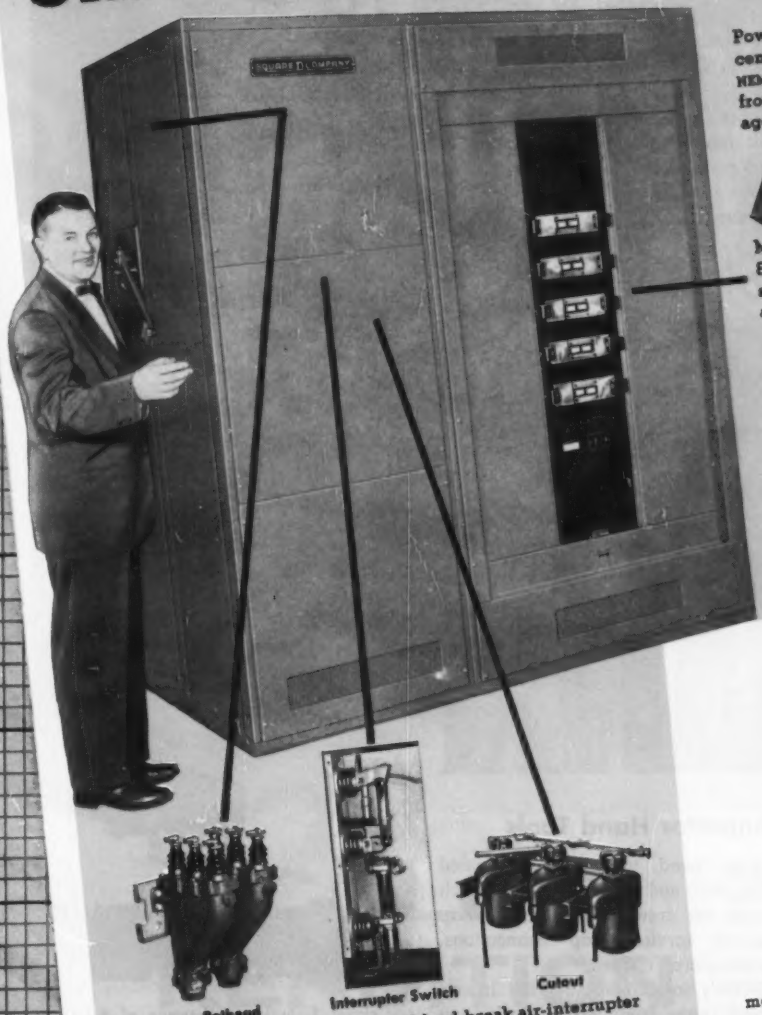
Ventilated steel case protects core and coil. Coils are vacuum impregnated with polymerizing varnish. Bulletin 100 is available.

Hevi Duty Electric Co, Milwaukee, Wis.



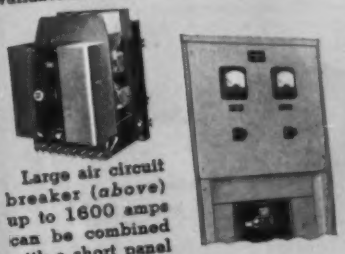
(*More New Equipment on page* 148)

SQUARE D's NEW Unit Substation IN POWER-STYLE CONSTRUCTION



Designed to match Square D's Power-Style switchboards and control centers, these new Unit Substations meet NEMA, ASA, and AIEE standards. Available from 75 to 500 KVA; in primary voltages up to 4800v; secondary up to 600v.

Molded case circuit breakers (*left*) up to 800 amperes and QMB Saflex fusible switches (*right*) up to 600 amperes are available in compact panel construction.



Large air circuit breaker (*above*) up to 1600 amps can be combined with a short panel in one section.

Pothead — Interrupter Switch — Cutout

Potheads, fused or unfused load break air-interrupter switches and fused or unfused oil-filled cutouts are available. Air-interrupter switches and cutouts are easily accessible from front of Substation.

REAR VIEW

3 single phase, dry-type transformers individually mounted on base in ventilated enclosure—heating and vibration held to a minimum. Transformers easily accessible for maintenance and inspection. When no air circuit breaker or metering equipment is used, entire area at top left is available for pull box.

SQUARE D COMPANY

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

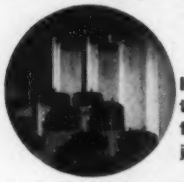
Ask these questions, too, when you judge a fluorescent lamp . . .

Is your investment protected?

Check Westinghouse Fluorescent Lamps against any other brands you are now using. Check them for maintained brightness, long life, uniform appearance. If you are not entirely satisfied on all counts, your full purchase price will be refunded.

Is it built with tailored glass?

Quality of glass in a fluorescent lamp directly affects lamp performance. Westinghouse makes all of its own fluorescent lamp glass, tailoring it from silica to finished tubing specifically for fluorescent service.



Is it the correct type, size and color for the lighting job to be done?

In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. Colors include seven different shades of "white" alone.

For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp Representative. "You can be sure if it's Westinghouse."

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

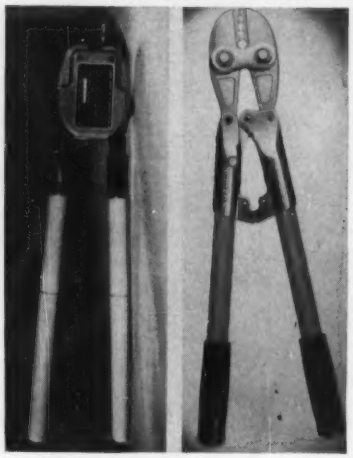
Mobile Substations

Designed for use by rural co-ops, a line of trailer-mounted mobile unit substations are available in 1,500 and 2,500-kva capacities. Two h-v winding options (67 and 33.5/67 kv) and two l-v winding options (12.47/7.2 and 13.2/7.62 kv) are available, making eight standard units.

Each unit can be mounted on either full or semi-trailer chassis to meet state highway limitations. The substations are about 22 x 8 x 12½ ft and weigh between 27,500 and 37,800 lb.

Components include h-v disconnecting switch, h-v Thyrite lightning arresters and h-v fuses; 3-phase, forced oil forced-air cooled power transformer in a sealed tank; automatic circuit recloser, l-v lightning arresters, and control and storage cabinet—all trailer mounted.

General Electric Co, Schenectady 5, N. Y.

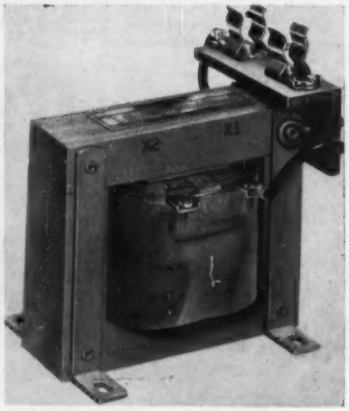


Connector Hand Tools

Two hand tools are designated MD4, left, and MD5, either of which permit the crew to install secondary line or service drop connections, manufacturer claims.

MD4's interchangeable die inserts permit range from No. 8 service tap through full-tension 2/0 splice on copper, aluminum or ACSR. Its crimping force is up to 9,000 lb. MD5 installs splicing and tapping connections on conductors through 2/0 ACSR, Crimping force is up to 6,500 lb.

Burndy Engineering Co, Norwalk, Conn.



Machine Tool Transformers

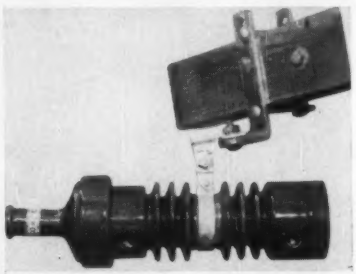
Line of machine tool transformers, rated 0.075 to 1.5 kva, are designed for control devices, and permit isolation of control circuits from power and lighting circuits. They operate at 230 to 575 v, single-phase, 50/60 cycles. A 95-v secondary tap is provided for use of 115-v, 60-cycle solenoid coils. Transformer can be supplied with 250-v cartridge-type fuse holder if desired.

Westinghouse Electric Corp, Box 2278, Pittsburgh 30, Pa.

Enclosed Fused Cutout

Redesigned, bayonet-type enclosed fused cutout for distribution load switching incorporates these changes, according to manufacturer:

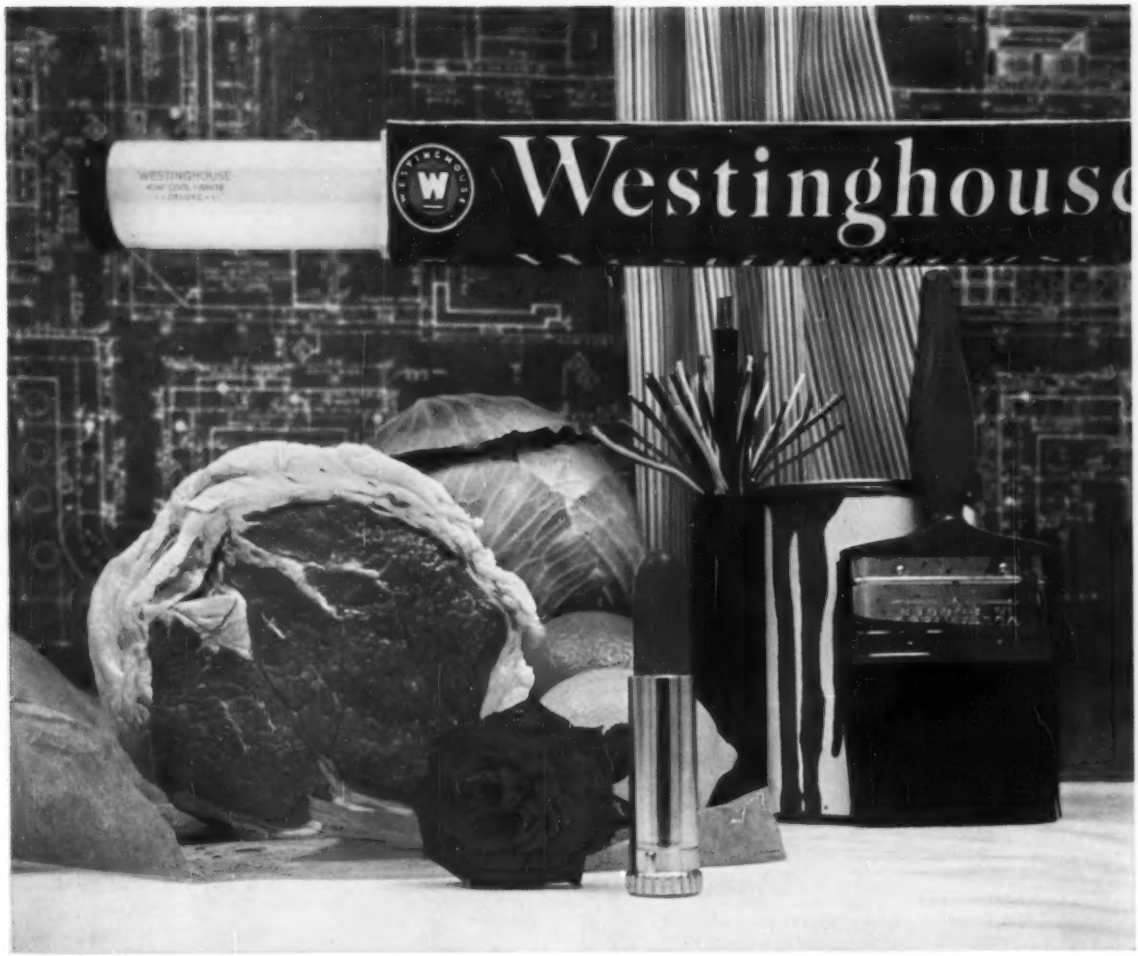
1. Line terminals, changed to presture bar type, accommodate broad range of aluminum or copper conductor sizes; **2.** leakage distance of 5-kv, 100-amp cutout increased to match manufacturer's 7.5-kv unit for service in coastal areas or contaminated atmospheres; **3.** auxiliary sleeve liner, made of arc-extinguishing plastic, confines, minimizes and extinguishes arc during load switching.



Designated Positect, the cutout is

(*Continued on page* 151)

how to judge a fluorescent lamp . . . point no. **5**

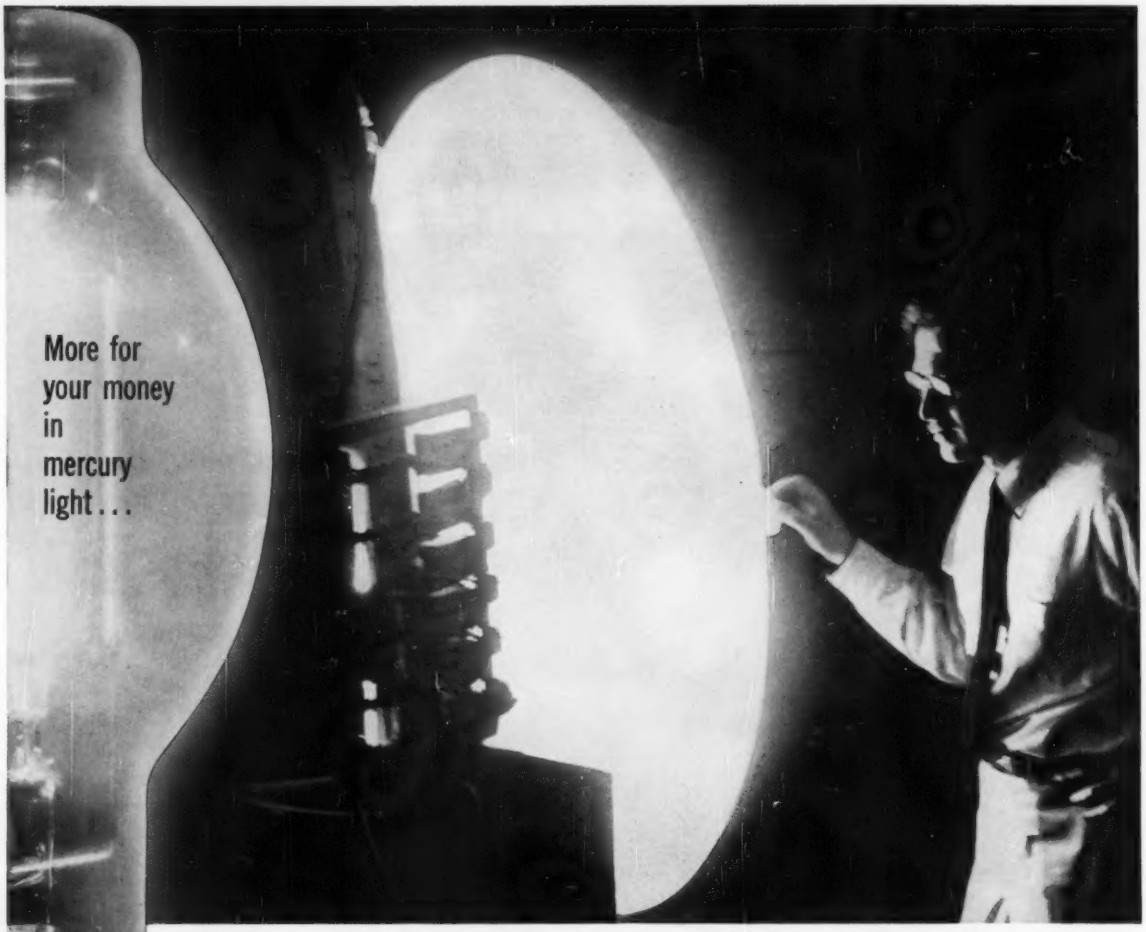


ask about **COLOR RENDITION**

If you're like most businessmen today, you know how the proper use of color can speed a lagging production line, work wonders with office morale, give merchandise extra sales appeal. What you may not know, however, is that the color of any surface—be it desk top or cabbage leaf, electrical lead or your secretary's complexion—is largely determined by how that surface is lighted. *And* that light just right for Job A may be all wrong for Job B. Westinghouse fluorescent lamps—available in seven different shades of "white" alone—offer you precisely the proper color of light for jobs from A to Z. "You can be sure if it's Westinghouse."

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***



NEW, INCREASED LIGHT OUTPUT FOR 13 WESTINGHOUSE MERCURY LAMPS

Now—through advanced design and manufacturing techniques—the most widely used Westinghouse Mercury Lamps give you more light when *new*, more light *for life*.

Look at the following chart. It shows the new boost in initial light output for just two of the most widely used Westinghouse Mercury lamps . . .

Lamp	Initial Lumens	
	Old Rating	New Rating
400-watt E-H1	20,000	21,000
400-watt J-H1	19,000	20,000

And there are similar high increases for *eleven* other popular Westinghouse Mercury Lamps.

But that's only half the story! For not only do these new, improved Westinghouse Mercury Lamps give increased light output to start with, they also *maintain* higher light output throughout their long life. For example . . .

Lamp	Approximate Lumens at 4000 Hours	
	Old	New
400-watt E-H1	15,000	15,800
400-watt J-H1	14,000	14,700

These new Westinghouse Mercury Lamps are absolutely unequalled for *long useful life*. So today, even more than before, Westinghouse Mercury Lamps are by far your best buy for all high-intensity lighting.

This significant advance in Westinghouse Mercury Lamp performance is further evidence of Westinghouse leadership in mercury lighting—one more proof that Westinghouse Mercury Lamps give you *"more for your money in mercury light."*

Westinghouse Guarantees the service life of all its widely used types of quartz mercury lamps. For full details call your Westinghouse Lamp Representative—or write Westinghouse Lamp Div., Dept. 00-0, Bloomfield, N. J. You can be *sure* . . . if it's Westinghouse.

TYPICAL MONEY-SAVING FEATURES OF WESTINGHOUSE MERCURY LAMPS . . .

Hi-Temp life-time-tight bases—non deteriorating bonding material eliminates costly problems of loose bases, cracked bulbs, breakage when lamps are removed from sockets.

Molybdenum Ribbon Seals—just .005" thick—permit easy expansion and contraction of lead-in wires and bulb material. Result: longer lamp life, fewer early failures.

WATCH WESTINGHOUSE *WHERE* ***BIG*** *THINGS ARE HAPPENING FOR* ***YOU!***

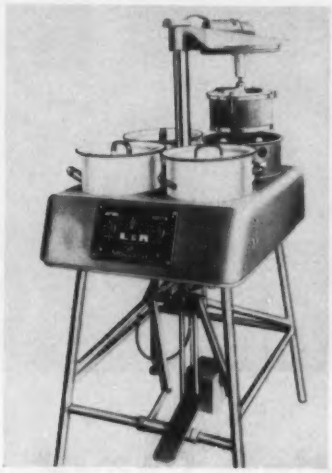
Ask about new Westinghouse WEATHER DUTY (TM) Mercury Lamps!

Cutout

(*Continued from page* 148)

available with 10,000 and 12,000-amp asymmetrical interrupting capacities for 50 and 100-amp sizes, respectively, with 14,000 and 16,000-amp one-shot fuse protection. It is also available for full-load switching of load currents to 200 amp without external arc, manufacturer claims.

S&C Electric Co, Chicago 40, Ill.



Cleaning Machine

Basket size of this 200-lb cleaning machine is 8 in. diam by 4 in. deep, or 225 cu in. Over-all unit size is 28½ x 25 x 55 in. It features pulsating motor action, front panel controls and a foot-pedal control permitting locking action. Drying chamber has three heat ranges. A mechanical timer is available. The unit's application is cleaning, rinsing, polishing and drying of small industrial parts.

L & R Mfg Co, 577 Elm St, Arlington, N. J.

Bendable Tubing

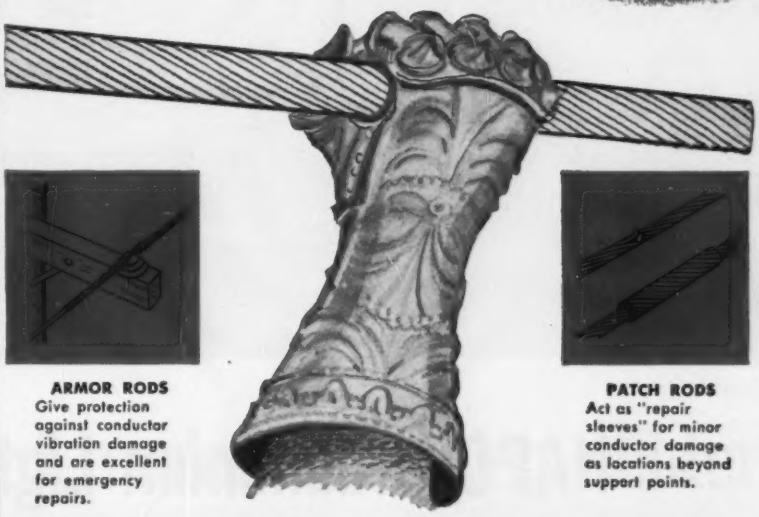
Said to save installation time, a ⅜ through 2-in. ID line of bendable tubing is now made in U. S. Called Plica, the tubing has a 3-ply wall and can be made in combinations of ferrous and non-ferrous metals, fiber, paper or other materials, manufacturer claims. It is used for electrical con-

(*Continued on page* 154)

WHEREVER Protection IS NEEDED ON OVERHEAD CONDUCTOR LINES

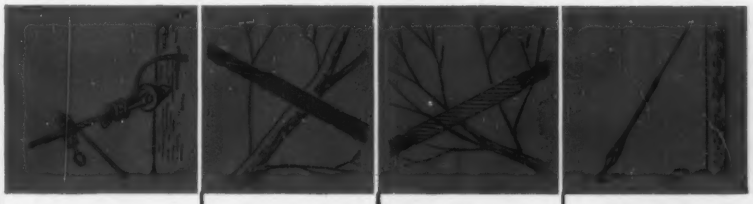
fine FANNER Superformed PRODUCTS

provide it better... easier... at substantial savings



ARMOR RODS
Give protection against conductor vibration damage and are excellent for emergency repairs.

PATCH RODS
Act as "repair sleeves" for minor conductor damage at locations beyond support points.



TAP ARMOR
Protective layer of shortened rods facilitate making taps without risking conductor damage.

PLASTIC FANNGUARDS
Tough, durable plastic sleeves used on covered wires for protection against tree abrasion.

ALUMINUM LINEGUARDS
Made to protect triplex cable or bare conductors against abrasion electrical damage.

FANNGRIPS
For a permanently positive grip on guy strand with maximum economy in material and labor.

Whenever you need accessory items for overhead distribution and transmission lines, you'll do far better by standardizing on Fine FANNER Superformed PRODUCTS. Each product in the FANNER Superformed line is precision manufactured to install easier and faster on the job. Careful packing insures safe delivery and simplified storage. Highest quality materials provide long life regardless of the type of installation. With all their extra features, FANNER Superformed PRODUCTS cost no more than ordinary products.

For full information on the Fine FANNER Superformed Line, write for literature and prices today!

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Fine FANNER Superformed

THE FANNER MANUFACTURING CO.

Electrical Products Division

Brookside Park Established 1894 Cleveland 9, Ohio

AGENTS AND DISTRIBUTORS IN PRINCIPAL CITIES

HAPCO Aluminum Lighting Standards

...the choice of modern shopping centers for beauty...strength...economy

HAPCO Tapered Aluminum Poles and Lighting Brackets are the choice for many modern shopping centers because of their day and night attractiveness, structural strength, economy of erection and maintenance. The silver-grey, Venetian column design blends with the most modern architecture and either meets or exceeds accepted industry structural standards. No initial painting or subsequent maintenance of lightweight HAPCO Aluminum Poles means substantial savings in handling, transportation and erection.

HAPCO Aluminum Standards are particularly well suited for heavy industrial and seacoast areas with corrosive atmospheres. In addition, aluminum is highly resistant to calcium chloride compounds widely used in northern areas for winter maintenance of streets and parking areas.

Among the complete line of HAPCO Aluminum Lighting Standards is a HAPCO Pole with Bracket design to best meet *your* outdoor lighting requirements.

FREE CATALOG

For design specifications, general information and installation views of HAPCO street and flood lighting standards, special purpose poles, pedestals, brackets and accessories, write today for Catalog HAL 754. This booklet contains many ideas and helpful information to aid you in planning modern outdoor lighting for a variety of conditions. Hubbard Aluminum Products Company, 6301 Butler Street, Pittsburgh 1, Pa.

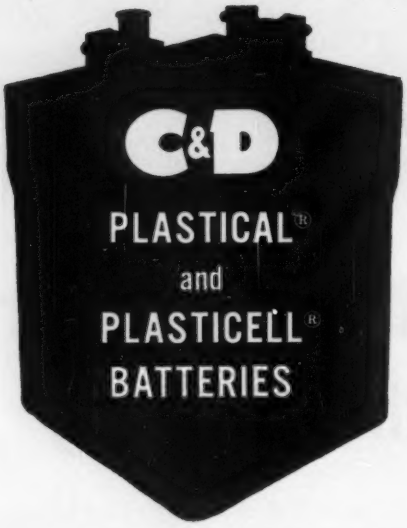
HUBBARD ALUMINUM PRODUCTS COMPANY

Division of Hubbard & Company

Pittsburgh 1, Pa.

Now—"engineered" power

for switchgear-control —emergency lighting —auxiliary power



Compact, modern-design "power plants" engineered for specific applications! C & D PlastiCals and PlastiCells give you completely dependable power—*where power must not fail!*

PlastiCal—with lead-calcium grids for maximum life—is conservatively engineered for at least 25 years in full-float service. PlastiCell—with high-tensile alloy grids—has a projected life of 14 years in float service.

WITH BOTH PLASTICAL AND PLASTICELL YOU GET SUCH ADVANCED C & D DESIGN EXTRAS AS:

1. Extra-long life—exclusive design combines advantages of both suspended and supported plate construction.
2. Triple insulation—thick Fiberglas mat, microporous separators, and perforated Koroseal retainer.
3. Saftee-Vent—outstanding C & D development that prevents accidental battery explosions.
4. Crystal-clear plastic jars—heat-resistant and hermetically sealed.
5. Plastite Post Seals—for easier maintenance, and at the lowest lifetime cost.

Write for C & D Specification Bulletins:
CP-536 Rev. 1 on PlastiCal Batteries
CP-537 Rev. 1 on PlastiCell Batteries

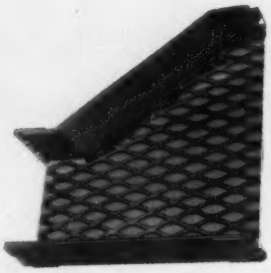
C&D BATTERIES, INC.
of Conshohocken, Pa.
Industrial Batteries since 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

Tubing

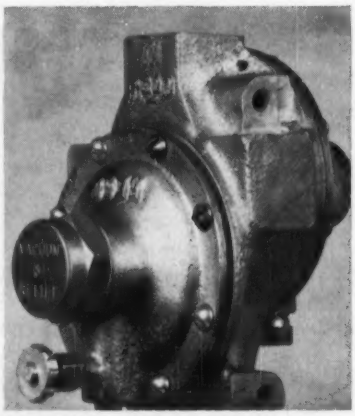
(*Continued from page* 151)

duit, lubricating, coolant and other non-corrosive liquid lines; hot and cold air ducts; mechanical protection; and insulation of pipes and flexible shaft casing. Bulletin 61 available.
Flexaust Co, 100 Park Ave, New York 17, N. Y.



Offset Reducer

Available with left and right hand bends, an offset reducer comes in any combination of 6, 9, 12, 18, and 24-in. standard widths. A straight reducer is also available in same combinations. The fittings are designed for manufacturer's metal trough.
T. J. Cope, Inc, Collegeville, Pa.



Pressure-Vacuum Bleeder

Now being supplied on manufacturer's sealed type power transformers, a pressure vacuum bleeder device is said to combine both pressure and vacuum relief mechanisms in one housing. It includes provision for mounting a pressure vacuum gage.

A diaphragm centered with 0.008-

(*Continued on page* 156)

VICTOR PROGRESS REPORT #4

We use BLACK LIGHT to certify soundness of

VICTOR INSULATORS!

Soundness of insulator porcelain is of utmost importance to every power man. Tiny imperfections, too small for detection by eye alone, can bring about costly failure and interruption of service. VICTOR certifies the soundness of porcelain insulator bodies by the use of "black light." Before firing, insulators are sprayed with a fluorescent material, then subjected to a near ultra-violet light. This process detects the slightest imperfection in the body mass for subsequent rejection. It assures you of sound, perfect insulators, cuts costs, minimizes replacements, safeguards service. Another reason why VICTOR produces the best insulators that money can buy!

"BETTER INSULATORS THROUGH RESEARCH"

SPECIFY VICTOR

Purified Porcelain

Insulators!

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware

It's a good idea to call

FLINT

The integrity of an organization is best evidenced by the qualifications of the men who represent it and their ability to serve their customers.

FABRICATED STEEL PLATE

STEEL WAREHOUSE DISTRIBUTORS

FABRICATED GALVANIZED STEEL

FABRICATED STRUCTURAL STEEL

FABRICATED REINFORCING STEEL

CONCRETE REINFORCING STEEL INSTITUTE C.R.S.I. FOUNDED 1924

AISC

for over 40 years

FLINT STEEL CORPORATION

TULSA . . . MEMPHIS

Bleeder

(*Continued from page* 154)

in. tolerance provides pressure change sensitivity. Bleeder limits the changes in tank pressure to values from 5 to 10 psi positive and 5 to 8 psi negative pressure, according to customer specification.

General Electric Co, Schenectady 5, N. Y.

More New Products

Kingston Industries, 527 Lexington Ave, New York 17, N. Y., says its aluminum, custom-made **reflectors** for incandescent and fluorescent lamps give high lumen readings without increases of wattage.

D. W. Onan & Sons, Inc, Minneapolis 14, Minn., has developed a controlled **ventilation system** for line of air-cooled electric plants. A centrifugal blower mounted on front of engine crank shaft pulls air to and over the directly connected component. It's optional on 500 to 5,000-w sizes, standard on 7½ and 10-kw sizes.

Jaspar Blackburn Corp, 35 Madison St, St. Louis 6, Mo., offers a **conductive compound** called Contax. Consisting of mineral base grease with nongassing zinc dust held in suspension, the compound comes in a vinyl plastic, refillable container.

General Electric Co, Trumbull components department, Plainville, Conn., has added 700 and 800-amp ratings for **L frame molded case circuit breakers.** New ratings are available in 2 and 3-pole designs for up to 600 v ac or 250 v dc. Nonautomatic 2 and 3-pole L frame breakers for circuit interrupting are also made in 800-amp ratings.

C. R. Daniels, Inc, Daniels, Md., offers neoprene-coated **nylon fabric** in 138 and 144-in. widths for use as windbreaks, portable shelters and tarpaulins.

Line Electric Co, 1407 McCarter Highway, Newark 4, N. J., has medium-duty **power relays** with silver contacts rated 10 amps, 115 v, 50-60 cycles for non-inductive load.

(*More New Products on page* 158)

NEW Chance Type H1 Vertical-Break Switches

Rotating stack...group operated...
7.5 through 69 KV — 400 — 600 — 1200 amps

The design requirement for this new Chance Type H1 Vertical-Break Switch was to "give it everything, but keep it simple." The most critical engineer will agree that this has been accomplished in the new H1, that completes the most modern line of braidless switches—the Chance S (Side Break) the C (Center Break) and H (Vertical Break).

This design simplicity brings you a switch that is exceptionally easy to install and easy to operate, yet incorporates all the features power men want for substation and pole top switching. Features like:

- Silver to copper, self-wiping, high pressure, adjustable jaw contacts. Silver contact bars are brazed on the blade end.
- Silver to copper, sealed hinged contacts maintain continuous contact through complete operating cycle.
- Only 3 moving parts... for years of dependable performance in any kind of weather.
- Blade closes with rotating motion that makes clean, high pressure contact ... breaks ice formations with ease.
- Sealed main bearing assembly for continuous smooth operation.
- Coin-silver bars brazed on blade tip for positive current transfer.
- Braidless current path with sealed hinge contact and silver-to-copper jaw contacts.
- Field adjustments, if necessary, can be made without special tools.
- All parts easily accessible.

New Chance Type H1 Vertical-Break Switches meet NEMA and AIEE requirements.

CS56-22

Cutaway view of hinge mechanism: Hinge contacts remain completely enclosed at all times ... protected from oxidation and corrosion. Pressure springs are beryllium copper.

Brazed-on silver contact bars extend from the switch blade to give lifelong positive contact.

To get your copy of the H1 Bulletin write:

ABC INDUSTRIES

A·B·CHANCE CO.

General Offices: Centralia, Missouri

MR. LINEMAN:

WHAT DO YOU KNOW ABOUT RT&E?

As one of the important men who keep power flowing to the nation's homes and industries, you should know something about one of America's leading suppliers of power equipment.

We are not the largest transformer builder, but we *are* one of the most conscientious. We know that your only concern is that a transformer work right, that it stand up in service and be easy to maintain. We know that extra time on our end can save *you* hours of trouble shooting.

Many of our exclusive design features were suggested by you and built for your convenience. Our externally-operated tap changer is standard equipment. You operate our dual voltage control from outside the tank, without removing the unit from the pole. Our weights are balanced for the highest load capacity per pound. These are features you want.

Next time you see "RT&E" on a transformer you install, you can be sure it'll be as trouble-free as a transformer can be.

RT&E CORPORATION
WAUKESHA, WISCONSIN

Equipment to help provide power for America

More New Products

(*Continued from page* 156)

General Radio Co, 275 Massachusetts Ave, Cambridge 39, Mass., offers a high-sensitivity **electrometer and dc amplifier** which indicates voltage, current and resistance on a panel meter.

General Electric Co, Schenectady 5, N. Y., has 300 and 400-amp models of an engine driven **welder** with ranges of 60-375 amp, 80-500 amp and 3/32-5/16-in., 1/8-3/8-in. electrode capacity, respectively.

Bell Electric Co, 1844 W. 21st St, Chicago 8, Ill., offers weatherproof line of **1 and 2-gang receptacles, switches** and combinations. Bulletin 21202 available.

CATALOGS—BULLETINS

● **SPLICING:** Instructions and applications for brand splicing kit 90-B1 are included in 4-page booklet. Minnesota Mining & Mfg. Co, 900 Fauquier St, St. Paul 6, Minn.

● **UTILITY TRUCK EQUIPMENT:** Line of public utility truck equipment and accessories is described in 56-page catalog. Highway Trailer Co, Edgerton, Wis.

● **FIRE ALARM SYSTEMS:** Interpretation of NFPA code on fire alarm systems and description of available systems are given in 10-page bulletin. Edwards Co, Inc, Sales Promotion Dept, 90 Connecticut Ave, Norwalk, Conn.

● **BOOSTER TRANSFORMERS:** Bulletin TR2, 2 pages, gives data on small dry-type booster transformers single and 3 phase, designed for air conditioning and refrigeration equipment. Kolton Electric Mfg Co, 123 New Jersey Railroad Ave, Newark 5, N. J.

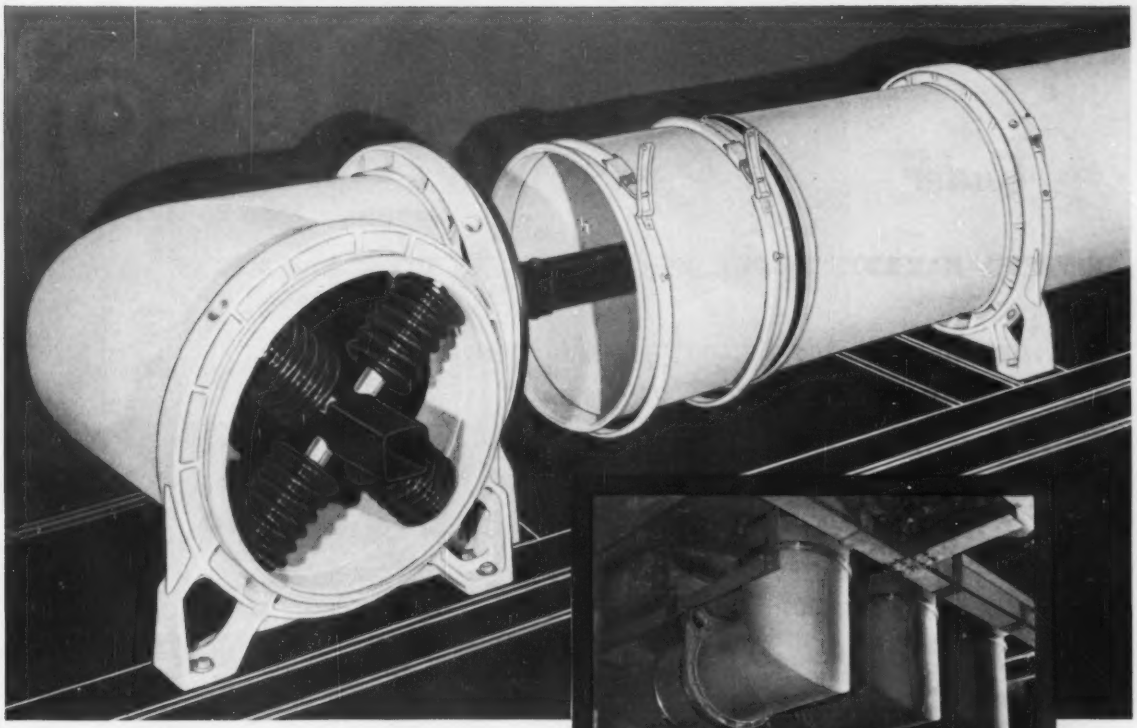
● **MATERIALS HANDLING:** Catalog 564, 50 pages, includes data and features of vibratory materials handling equipment. Syntron Co, 205 Lexington Ave, Homer City, Pa.

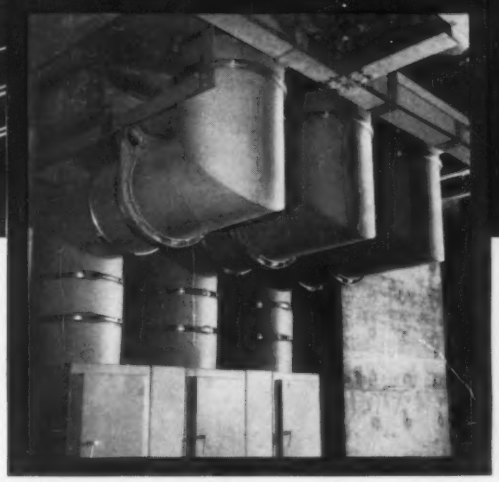
● **SWITCHGEAR:** Design changes in metal-clad switchgear with magne-blast circuit breakers are included in Bulletin GER-1194, 8 pages. General Electric Co, Schenectady 5, N. Y.

● **CANNED MOTOR PUMP:** Axial flow design canned motor pump with 20-ft heads and 22-gpm capacity is detailed in 4-page Bulletin 1060. Chempump Corp, Station N, 1300 E. Mermaid Lane, Philadelphia 18, Pa.

● **GARDEN LIGHTING:** Four-page Bulletin 135-56 illustrates line of garden and play area lighting equipment. Steber Mfg Co, Broadview, Ill.

(*More Catalogs on page* 162)





Delta-Star can say it about isolated phase buses too:

original or similar...which do you prefer?

"Imitation is the most sincere form of flattery!" When Delta-Star introduced the new isolated phase bus with telescoping covers, its time-and-money-saving value was immediately recognized by utility engineers and by the fact that similar buses were soon introduced in the market.

Delta-Star's original telescoping-cover bus is quick, easy, and economical to install. Covers are an integral part of the enclosure—no bolts needed, no covers to lift, and no longitudinal gaskets to install.

Quick access reduces bus inspection and maintenance time. Easily operated clamping rings lock and seal enclosure against dust and moisture.

Similarities help prove the exceptional value of the original.

If you are not fully acquainted with the exclusive features and advantages of Delta-Star "originals," check with your nearby Delta-Star representative soon.

DELTA-STAR ELECTRIC DIVISION

A DIVISION OF H. K. PORTER COMPANY, INC.

H. K. PORTER COMPANY, INC.

2437 Fulton Street · Chicago 12, Illinois · District offices in principal cities

Under

'THE SIDEWALKS OF NEW YORK'...

...lies Consolidated Edison's fabulous power cable network, largest in the world.

RoMarine-RoPrene network cable forms part of this system.

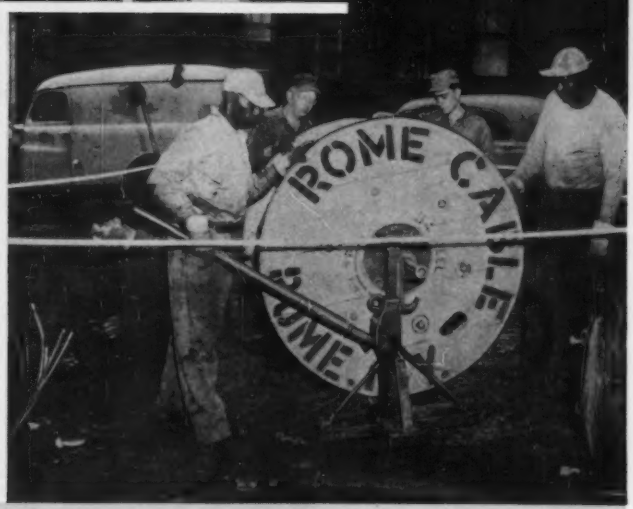
At 160th Street and Riverside Drive a "Con Edison" crew . . .

RoMarine-RoPrene, accepted for use by Consolidated Edison in their vital network, has many advantages which will benefit you, too.

RoMarine insulation is a high-quality heat- and moisture-resistant insulation with outstanding electrical stability after long-time submersion in water. It also offers excellent aging and overload characteristics, ease of handling and installation. Splicing is simple.

RoPrene sheath is tough, all-resistant Neoprene with its exceptional resistance to abrasions, acids, oils, flame, weathering and moist chemicals.

It will pay you to investigate the advantages of Rome RoMarine-RoPrene cable for your underground duct or direct-burial-in-earth installations. Send today for more complete information.

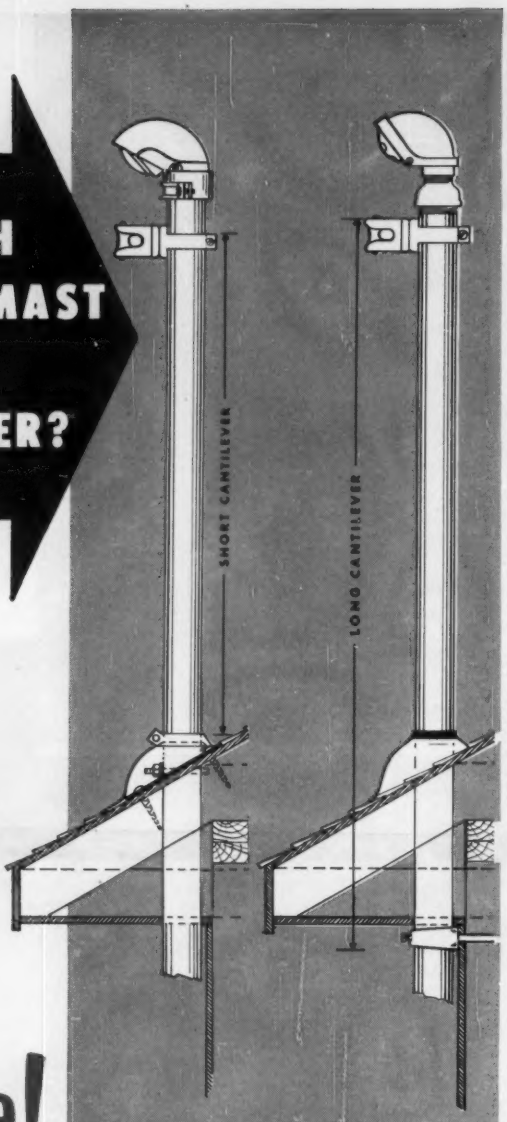


. . . installs Rome network cable (RoMarine-RoPrene) . . . in New York's underground system.

It Costs Less to Buy the Best

ROME CABLE
Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

WHICH SERVICE MAST IS STRONGER?



SERIES 2075 MAST KIT

MAKE-SHIFT MAST

Series 2075 Of Course!

Porcelain Products service mast kits make possible strong, safe, trouble-free mast installations. The exclusive Roof Mounting Plate anchors the mast at the highest possible point (roof level) on the strongest possible framing (the rafters).

Porcelain Products Mast Kits are complete in every detail . . . eliminating sloppy, make-shift installations. For complete details . . . write today!

ELECTRICAL PORCELAIN SINCE 1894

62 years Porcelain Products, Inc. PP INC.

FINDLAY, OHIO

Catalogs—Bulletins

(*Continued from page* 158)

● **REGULATORS:** Bulletin GEA-6386, 8 pages, describes new "RM' line of induction voltage regulators. General Electric Co., Schenectady 5, N. Y.

● **POWER DERRICK:** Capacities, dimensions and features of a new Series 5700 power derrick are given in 4-page catalog. J. H. Holan Corp, 4100 W 150th St, Cleveland 11, Ohio.

● **THERMOMETERS:** Bulletin 148, 4 pages, describes line of bi-metal thermometers. Manning, Maxwell & Moore, Inc, Stratford, Conn.

● **SMOKE INDICATOR:** Operating and specification data, installation drawings on smoke indicator system are included in 4-page Bulletin CM-22. Electronics Corp of America, 720 Beacon St, Boston 15, Mass.

● **ARRESTERS:** Features and tabular data on new line of distribution arresters are given in Bulletin GEA-6379, 16 pages. General Electric Co, Schenectady 5, N. Y.

● **SWITCHGEAR:** Design and construction features of indoor and outdoor, 13.8-kv, horizontal drawout, metal-clad switchgear with manufacturer's magnetic circuit breakers are given in Bulletin 18B8142. Allis-Chalmers Mfg Co, Milwaukee 1, Wisc. 932 S. 70th St.

● **VARIABLE SPEED DRIVES:** Features, operating principle, design and component parts are included in 16-page Bulletin 1,600-B7 P on variable speed drives with touch control. Also given are selection tables and graphic illustrations of drive dimensions. Worthington Corp, Harrison, N. J.

● **STEEL SURFACE PROPERTIES:** Eight-page Bulletin 5 describes manufacturer's process for increasing heat, wear and corrosion resistance of steel by high-temperature diffusion of chromium into surface. Chromalloy Corp, 450 Tarrytown Road, White Plains, N. Y.

● **ROTATING LIMIT SWITCH:** Design features and engineering data on rotating limit switch with pilot ratings up to 480 v are presented in Bulletin 5605, 4 pages. Furnas Electric Co, 1026 W. McKee St, Batavia, Ill.

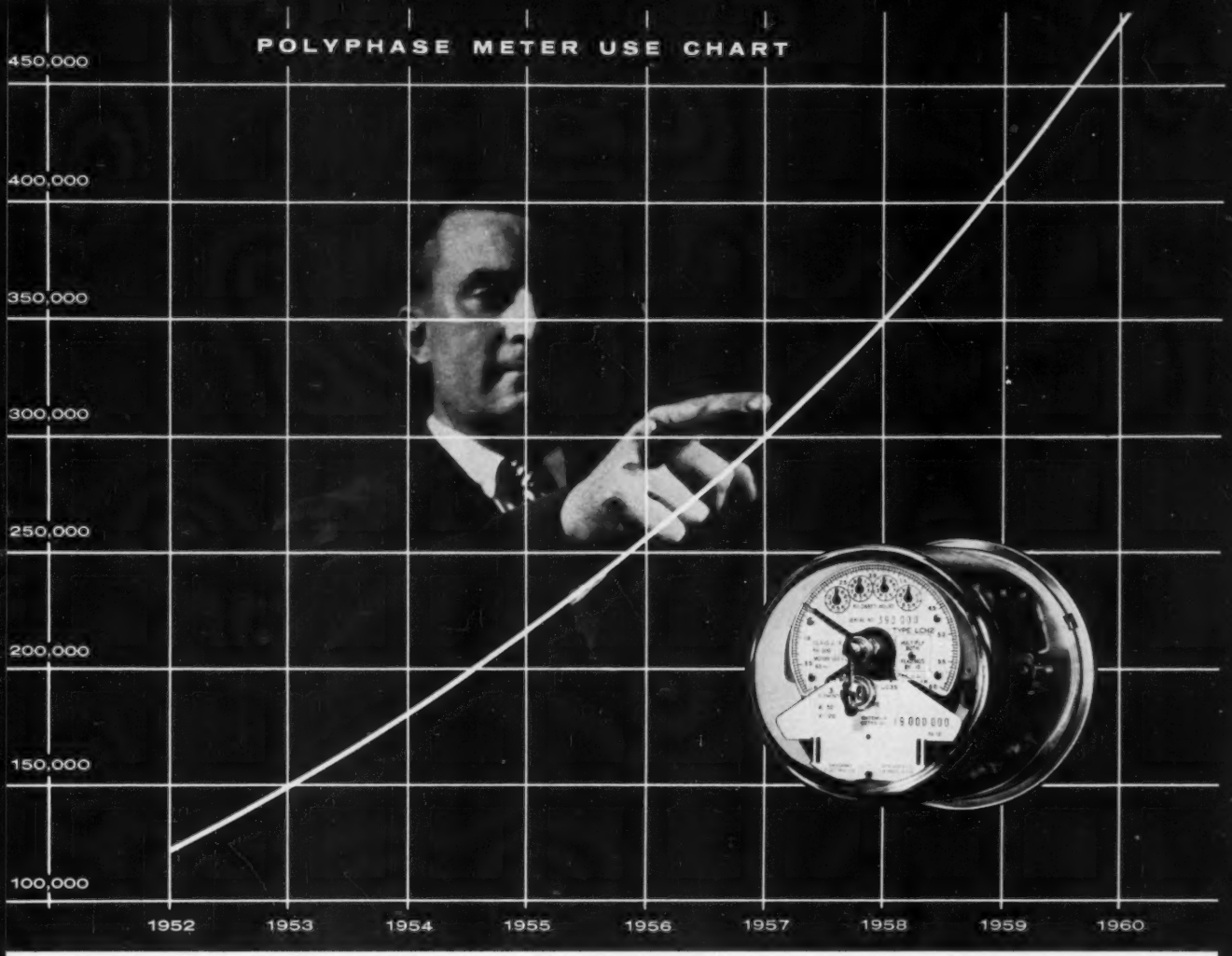
● **FLUID DRIVES:** Four-page Bulletin 9919 covers application of fluid drives in petroleum industry. American Blower Corp, Detroit 32, Mich.

● **TRANSFER SWITCH:** Four-page bulletin includes circuitry and mechanical features of automatic circuit breaker transfer switch design. Lake Shore Electric Corp, 205 Willis St, Bedford, Ohio.

● **SOLENOID VALVES:** Engineering information, flow charts, operation and construction details of solenoid valve line are provided in Catalog 201, 32 pages. Automatic Switch Co, 391 Lakeside Ave, Orange, N. J.

● **SUBMINIATURE SWITCHES:** Revised Catalog 75a describes 56 different switches, auxiliary actuators and assemblies, 16 pages. Micro Switch, Freeport, Ill.

(*More Catalogs on page* 164)



Polyphase meter usage going up!

For a polyphase future use Sangamo single disk meters

Polyphase metering is on the march. From past records it appears that the use curve of polyphase meters will reach 500,000 annually by 1960! Better look to your polyphase meters . . . now.

All Sangamo Polyphase Meters—2, 2½ *and 3 element*—are single disk meters. The 3 element meter takes no more wall space than the 2 element meter. When you change to 4 wire Y, you will find the 3 element meter fitting in where the 2 element meter was before.

The LC meters are high torque meters, ruggedly made for the polyphase loads of today and tomorrow.

Plan for a polyphase future—with Sangamo.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

SM56-7

MIF

malleable iron

high corrosion resistant

GUY CLAMPS

Flexibility. MIF Guy Clamps take a wide range of strand sizes. The two standard sizes cover a total of 8 strand sizes from 3/16″ to 1/2″.

Easier Installation. Can be placed on strand in seconds. Does not have to be taken apart. Clamp holds strand in place allowing one man with a 10″ wrench to complete installation.

Greater Holding Power. Unique tilting or 'come-along' action provides a clamping force that increases as load increases. MIF Guy Clamps are rated from 7,500 to 20,000 pounds.

Lower Cost. MIF Guy Clamps cost less than any other guying device. Require less handling in the field — and a smaller inventory on trucks and in the stock room.

For further information write for Bulletin PH 1.

MALLEABLE IRON FITTINGS COMPANY

POLE HARDWARE DIVISION

Branford, Connecticut

MIF

Canadian Mfr. & Dist.: LINE & CABLE ACCESSORIES, Ltd. TORONTO

Representatives: William J. Cottrell Co., Portland, Ore. • James H. Drew Corp., Indianapolis, Ind. • Industrial Engr. & Equip. Corp., Los Angeles, Cal. • JSG Electric Co., Chicago, Ill. • Lee-Smith Co., Miami, Fla. • B. H. McCoin, Knoxville, Tenn. • William J. O'Brien, Memphis, Tenn. • Robert P. Smith & Co., Jacksonville, Fla. • E. A. Thornwell, Inc., Atlanta, Ga. • J. P. Voight, Summerville, S. C. • Waltham, DeWitt & Krusi, San Francisco, Cal. • L. G. Wendegatz, Kansas City, Mo. • Williamson Sales Co., Shreveport and New Orleans, La.; Dallas, Houston, Tex.; Pine Bluff, Ark. • O. C. Witte Co., Detroit, Mich.

CATALOGS—BULLETINS

(*Continued from page* 162)

• **CAPACITOR DIGEST:** Collection of trade magazine stories on value of industrial capacitors comprise 20-page Bulletin GED-2978. General Electric Co, Schenectady 5, N. Y.

• **DEAERATION:** Publication 4650, 4 pages, gives fundamentals and applications of deaeration methods. Cochrane Corp, 17th St below Allegheny, Phila. 32, Pa.

TECHNICAL LITERATURE

ASTM STANDARDS—Publications of American Society for Testing Materials, 1916 Race St, Phila. 3, Pa., include:

• "ASTM Standards on Textile Materials (with related information)," a 788-page book, contains tentative and standard methods of test, specifications and definitions pertaining to textile materials. Price, $5.75.

• "ASTM Standards on Plastics" includes specifications, methods of testing, nomenclature and definitions. A 790-page book, it contains revisions since the May 1954 edition. Price, $5.75.

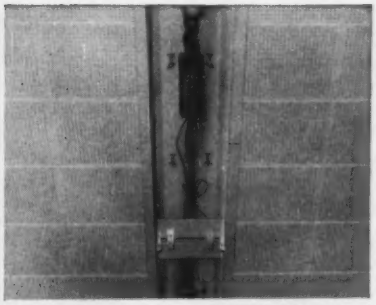
DRAFTING—A 56-page booklet, "Standard and Simplified Drafting Practices," details manufacturer's standards on drafting room practice and simplified drafting. Included is an address on this subject by Jay H. Bergen, American Machine & Foundry Co's standards administrator, before American Society for Engineering Education. Write on company letterhead to AM&F, public relations department, 261 Madison Ave, New York 16, N. Y.

GROUND-WAVE PROPAGATION—"Amplitude and Phase Curves for Ground-Wave Propagation in the Band 200 Cycles Per Second to 500 Kilocycles" provides basic information on low, very low and ultra-low frequency bands. The very low frequency radio waves, only slightly affected by ionospheric disturbances for ranges up to about 200 miles, are suitable for communication. National Bureau of Standards, U. S. Dept of Commerce, Washington 25, D. C. (Order from Government Printing Office; 17 pages, 20¢.)

NON-SHRINK GROUTING—Specifications on non-shrink grouting of heavy equipment, anchor bolts, building columns and bridge seats with pre-mixed grout are available from Master Builders Co, 7016 Euclid Ave, Cleveland 3, Ohio. Also offered is a functional specification for pre-mixed non-shrink grout.

BOX SPECIFICATIONS—Recommended specification for nailed wooden and lock corner boxes for domestic and export shipments of industrial items are given in an 8-page booklet. It is designed for general commercial use and does not supplant government nor ICC specifications. Write for Specification I-1A, National Wooden Box Assn, Barr Bldg, Washington 6, D. C.

LINE STANDARDS—"Calibration of Line Standards of Length and Measuring Tapes" is a guide for anyone contemplating submission of such items for standardization. The 11-page Circular 572 is available from National Bureau of Standards, U. S. Dept of Commerce, Washington 25, D. C.; price 15¢. (Order from Government Printing Office.)



2,200 GUTH TROFFERS CREATE AN "ACRE OF LIGHT" AT LOVEMAN'S

Shoppers are greeted by a store full of lighting that says "come in and buy" as they enter Loveman's Department Store, Montgomery, Alabama.

Nicknamed "an acre of light", this beautiful new store has over 86,000 sq. ft. of sales area. Every inch is efficiently lighted by 2,200 Guth Recessed Troffers and 265 Guth Tile-Lites. Tile-Lites were used between fixtures and at row ends for added interest in the long lines of light.

This striking troffer installation looks as if it were custom-made for Loveman's. The fixtures blend harmoniously with the modern decor. Gleaming snap-on trim hides flange screws and "teebar gap" for a distinctive, tailored appearance. The effect of "arrow-straight lines of light" was made possible by the precision alignment of the troffers.

In a job this size, installation work is a big factor. According to the electrical contractor, this "acre of light" was . . . a breeze . . . one man could have handled it! The fixtures arrived in complete units . . . ready to mount. They fitted the "tile-wide" openings perfectly.

The troffers, with 35° x 30° metal eggcrate shielding provide 40 F. C. halfway between rows. Readings were taken at 34" above the floor.

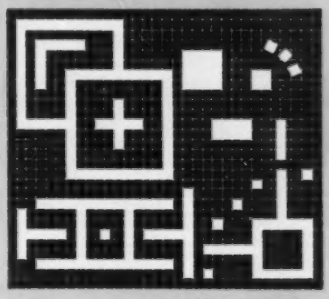
Another factor in the choice of Guth Troffers was maintenance economy. They have hinged shield frames for easy relamping or cleaning. Slide-in reflectors are simple to remove. Electrical apparatus may be replaced without taking troffers down.

Loveman officials give a great deal of credit to Guth Lighting for making their store a pleasant place to work, to shop . . . and to make profits!

Loveman's is part of the new Normandale Shopping Center—33 shops and stores, all lighted with Guth Troffers. It was developed by Aronov Realty Co., Inc.; Architect, Sherlock, Smith & Adams; Electrical Engineer, J. L. Phillips; Electrical Contractor, Long & McGhee Elec. Co.; General Contractor, Jehle Brothers, Inc.; Distributor, Noland Company, Inc.

Guth

LITE-BLOX TROFFERS
for sparkling lines of efficient light in any office or store
(See Loveman Article at left)



The most complete troffer line—

2 x 2's, 2 x 4's, 4 x 4's for unlimited pattern planning.

All types of shields from GrateLite* Louver-Diffuser to the new Paraflector and "Ro-Lo-B" Louvers.

WRITE ON YOUR LETTERHEAD TODAY FOR BIG NEW GUTH TROFFER CATALOG 50-H! FREE!

THE EDWIN F. GUTH CO.
ST. LOUIS 3, MO.

Guth

TRUSTED name in lighting since 1902

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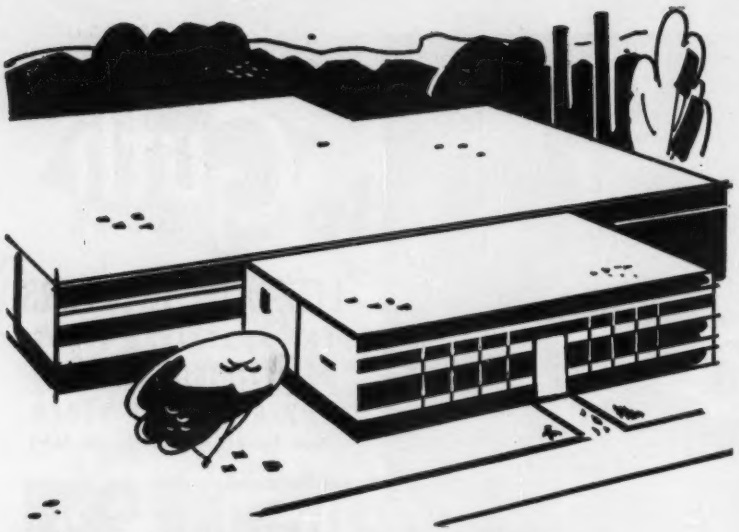

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The Safety Factor in Factory Expansion

One of the highest rated temperature cables made, Continental AVA adds important safety and savings to your plans —whether it's an entirely new distribution or necessary changes in an existing wiring system. Ideal for open or in conduit installation where the need exists for **high current carrying capacities** and resistance to **high temperature,** oil, grease, corrosive vapors or moisture. Available in a wide range of sizes from 18 AWG to 2,000,000 CM, 600 to 5000 volts.

CONTINENTAL TYPE AVA—3000 volt service

Available sizes 14 AWG—2,000,000 CM inclusive.

Stranded copper conductor protected by five layers of insulating material—felted asbestos, varnished cambric, cellophane separator, asbestos insulation and asbestos braid. **For your wiring needs.** Continental's industrial wire and cable specialists are available to serve you at any time. Write for complete catalog.

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Wallingford, Conn., Phone COlony 9-7718

Continental
WIRE CORPORATION

WALLINGFORD, CONNECTICUT • YORK, PENNSYLVANIA

BOOKS

Books Received Since June 6

Wechselstrommebtechnik. By Dr. Ing. F. Koppelmann. Published by Springer-Verlag, Reichpietschufer 20, Berlin W 35, Germany, 225 pages, illustrated. Price DM 30.

Beitrage zur Theorie des Ferromagnetismus und der Magnetisierungskurve. By von W. Koster. Published by Springer-Verlag, Reichpietschufer 20, Berlin W 35, Germany. 189 pages, illustrated. Price DM 24.

Automation Friend or Foe? By R. H. Macmillan. Published by Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 100 pages, illustrated. Price $1.95.

Reactor Shielding Design Manual. By Theodore Rockwell III. Published by McGraw-Hill Book Co, 330 W. 42nd St, New York 36, N. Y. 481 pages, illustrated. Price $6.00.

Electrical Interference. By A. P. Hale. Published by Philosophical Library, Inc., 15 E. 40th St, New York 16, N. Y. 122 pages, illustrated. Price $4.75.

Principles of Color Television. By Hazeltine Laboratories Staff, Edited by Knox McIlwain and Charles E. Dean. Published by John Wiley & Sons, Inc., 440 Fourth Ave, New York 16, N. Y. 610 pages, illustrated. Price $13.00.

Atoms and Energy. By Prof. H. S. W. Massey. Published by Philosophical Library, Inc., 15 E. 40th Street, New York 16, N. Y. 174 pages, illustrated. Price $4.75.

Faster, Faster. By W. J. Eckert and R. Jones. Published by McGraw-Hill Book Co, 330 W. 42nd St, New York 36, N. Y. 160 pages, illustrated. Price $3.75.

Electronic Computers and Management Control. By George Kozmetsky and Paul Kircher. Published by McGraw-Hill Book Co, 330 W. 42nd St., New York 36, N. Y. 296 pages. Price $5.00.

Power Generation

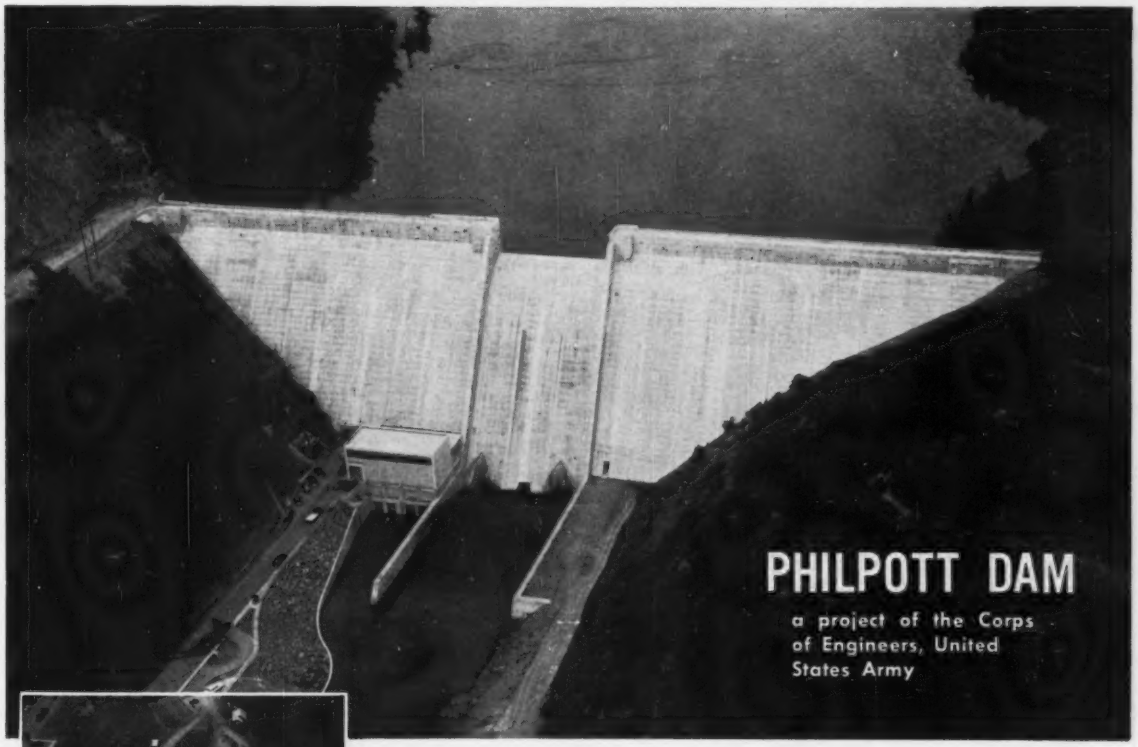
Electric Power Stations, Volume II—4th Edition. By T. H. Carr. Published by Chapman & Hall Ltd, 37 Essex Street, London, England. 832 pages, illustrated. Price 80s.

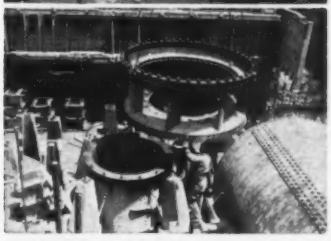
This volume deals with the electrical aspects of a steam power plant, and all features of hydro-electric, diesel-electric, and gas turbine plants. One chapter discusses briefly other types of power plants such as: nuclear, solar, wind, etc. In addition the book has material on condensers, and feedwater heating and treatment. Its companion Volume I presents the other mechanical and civil engineering design of steam power plants.

Steam conditions cited are low compared with American practices. Machine sizes are small and there is no mention of conductor cooling of generators. A few of the other differences are: High-voltage, air-blast circuit breakers, absence of combined control boards, large use of generator busses, and some use of high generator voltages (36 and 66 kv).

The section on gas turbines is excellent. It is highly recommended to the plant designer not familiar with this type of central station equipment.

(*Continued on page* 170)





Another Outstanding Installation of **Leffel Hydraulic Turbines**

Philpott Dam, a recent Corps of Engineers, United States Army, project on the Smith River in Henry and Franklin Counties, Virginia, is a site of another outstanding installation of efficient dependable Leffel turbines. The Philpott project was constructed for flood control and hydroelectric power generation. It is one unit of a comprehensive reservoir system planned for the Roanoke River basin.

Three Leffel turbines were installed at the Philpott power plant. Two are each rated at 9400 hp under 152 ft. net head, at a speed of 227 rpm; and the third is rated 860 hp at 720 rpm.

The view above shows the completed project. The views at the left show the project under construction, the spiral casing for one turbine in place, and a stay ring being lowered into place over the draft tube.

Other Leffel installations are dependably and efficiently producing power from water in this country and in all parts of the world. Leffel engineers are waiting to put their 94 years of experience with water power to work for you, whether your project is a completely new installation, or an expansion or rehabilitation of existing facilities. Write today for literature describing Leffel turbines for all hydraulic power requirements and showing a wide variety of outstanding Leffel installations.

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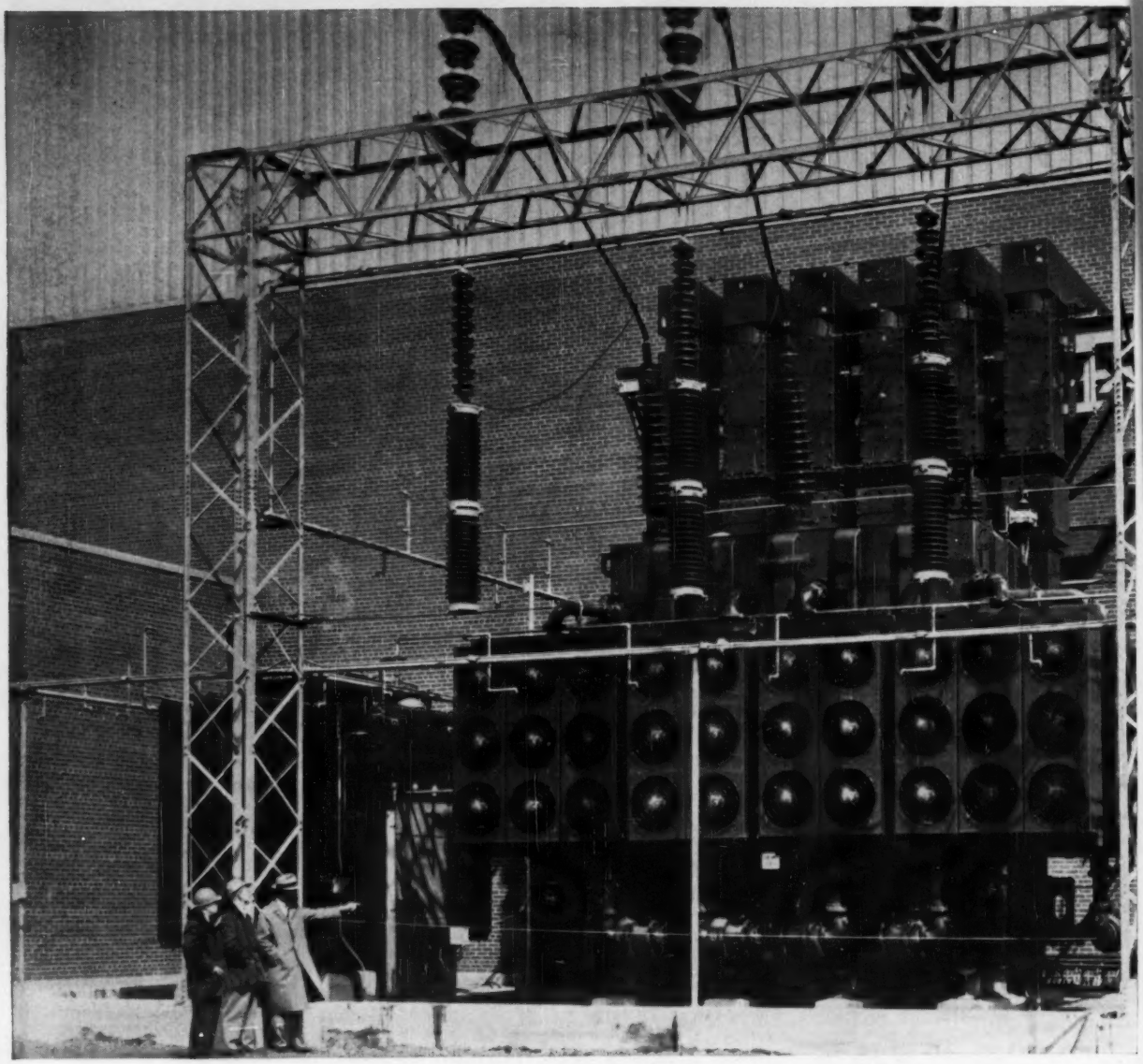
THE JAMES LEFFEL & CO.

DEPARTMENT P • SPRINGFIELD, OHIO, U. S. A.

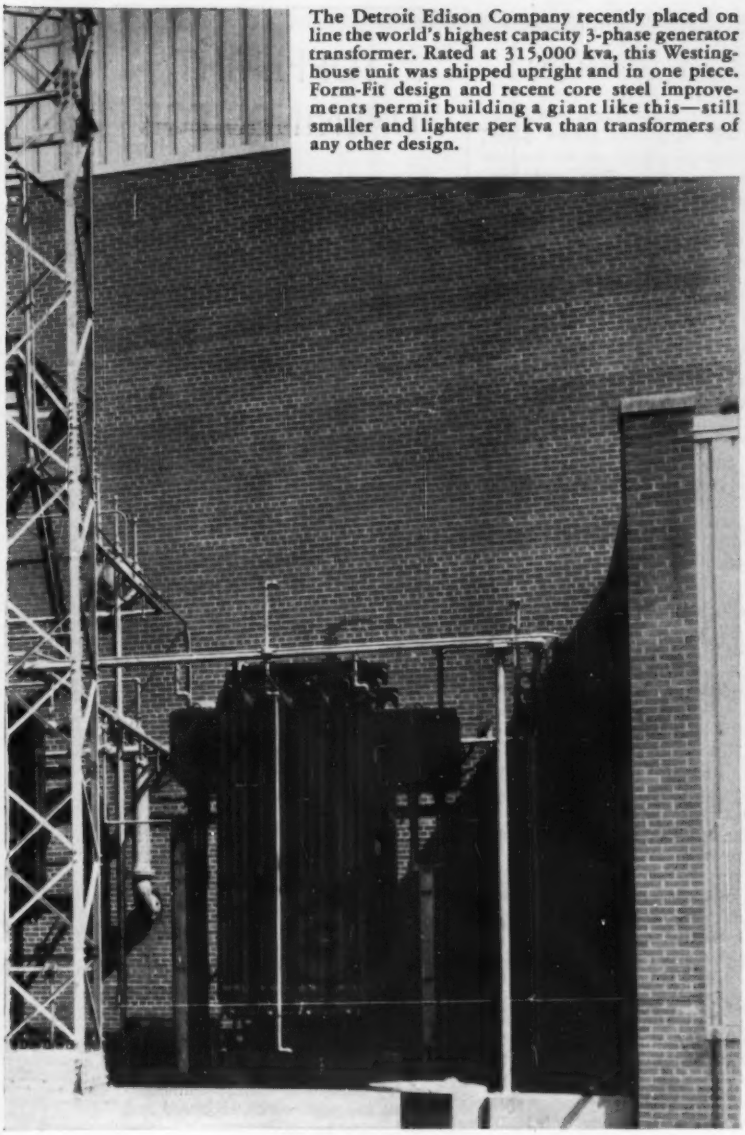
MORE EFFICIENT HYDRAULIC POWER FOR 94 YEARS



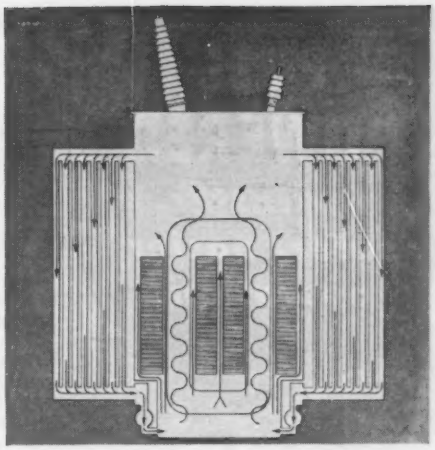
FORM-FIT® TRANSFORMERS

...A basic design with room to grow

World's highest capacity generator transformer
again proves economy of exclusive Westinghouse design

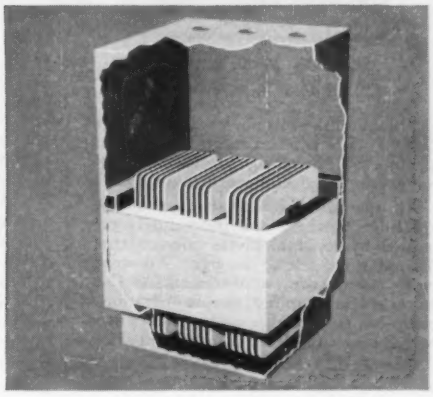


The Detroit Edison Company recently placed on line the world's highest capacity 3-phase generator transformer. Rated at 315,000 kva, this Westinghouse unit was shipped upright and in one piece. Form-Fit design and recent core steel improvements permit building a giant like this—still smaller and lighter per kva than transformers of any other design.



Close-fitting tank and vertical coil construction together form directed paths for coolant. Forced oil cooling eliminates the need for thermal head. Maximum coverage of coil surfaces and efficient use of oil give you a compact, economical unit.

With shell-form construction, the core surrounds, supports and protects a series of upright coils. This arrangement provides excellent mechanical strength . . . capable of withstanding the stresses imposed by shipping, installation and service.



Here is one basic idea in high-voltage transformers that has consistently given you more equipment per dollar invested. It's Form-Fit design. A Westinghouse exclusive, Form-Fit design has proved superlatively efficient, yet practical in both size and weight . . . at any rating.

Here is what Form-Fit construction does, for instance, to improve heat transfer while reducing bulk of the transformer. All coils are vertical, and in pancake-fashion are interleaved with insulation. This structure forms long, straight ducts allowing free flow of oil from bottom to top, and on both sides of each coil. With forced cooling, a high volume of oil circulates over a maximum surface, following these naturally efficient paths without the use of special baffles. Result? More efficient heat transfer and lower temperature differences.

And surge strength? Form-Fit design provides it, with the large-area coil giving high coil-to-coil and low coil-to-ground capacity. Distribution of impulse voltage is excellent. Dielectrically, the Westinghouse Form-Fit principle can be extended to any voltage level.

So here's a design with room to grow . . . for capacity not yet specified, for transformers not yet built. To make absolutely sure you get all the quality and performance you'd expect from Westinghouse, all power transformers rated above 10,000 kva and 69 kv are impulse tested right on the production line.

Get in touch with your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70768

WATCH WESTINGHOUSE *WHERE* ***BIG*** *THINGS ARE HAPPENING FOR* ***YOU!***

FULL POWERED

for faster, safer, easier operation!

CRANES

Utilities find the full powered operation of Gar Wood 2400 series cranes an important advantage in handling transformers, pipe, poles and large commercial appliances.

All operations—hoist, boom and swing—are fully powered and individually controlled by separate levers conveniently located at the side of the crane. Automatic swing cutouts prevent overswing. All these features add up to fast, simple operation... complete, full-time control...greater accuracy for spotting loads...maximum safety.

Gar Wood cranes are real space-savers, too. They require a minimum amount of space behind the cab...permit maximum payloads, do not interfere with regular use of body when crane is idle.

Gar Wood 2400 series cranes have a maximum capacity of 4.4 tons. Other series available with capacities from 1½ to over 8 tons. For complete information, see your Gar Wood-St. Paul distributor, or mail coupon below.

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Wayne, Michigan • Richmond, Calif.

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Please send me free Bulletin No. WC-202R that describes Gar Wood truck-mounted cranes.

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Address_____

Books

(*Continued from page* 166)

The author compares them cost- and efficiency-wise with the steam plant, gives a complete treatment on various cycle arrangements, and presents material on some of today's outstanding gas turbine plants.

The chapter on hydro plants gives some interesting information about the potential of tidal plants but there is very little material on pumped storage.

The author is very thorough in his presentation and has aided the reader considerably by wise selection of clear and pertinent illustrations, charts, graphs, and numerical examples. But use by American designers will be limited because the volume is based on British practices. Each chapter is concluded with a bibliography, but these also are almost entirely British.

How to Use Electronic Data Processing

Electronic Data Processing for Business and Industry. By Richard G. Canning. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, N. Y. 332 pages, illustrated. Price $7.00

Electronic data processing as a thing of the present deserves management attention. This book is designed to give management the answers it needs to make an intellegent appraisal and to prevent misapplication. It answers for management: What is electronic data processing? What can it do for my company? How should I go about investigating it?

The basic approach to the subject is systems engineering. It looks upon a company as an integrated operation in which a continual flow of information is necessary. Through systems engineering the author examines the informational requirements of the whole operation and lays out a data processing system to meet these requirements.

The book briefly covers basic operations of electronic computers and describes the method of instructing the machine to perform varied clerical functions. Once the electronic system has been laid out, it describes how available equipment may be compared with requirements to select the most suitable system. Operating characteristics of major commercial systems are presented as well as some of the improvements that can be expected in the future.

Finally the author summarizes a suggested plan of action for management for obtaining a reliable system. This program includes consideration of such factors as meeting legal document requirements, as well as the reliability of today's electronic computers. For management contemplating computer application, this book is a must.

TOPFLIGHT OPENINGS FOR

8

TOPFLIGHT ENGINEERS

Hubbard and Company, world's largest manufacturer of pole line hardware and electrical protective equipment, is in the midst of an expansion program that creates excellent opportunities for eight topflight engineers.

Hubbard plants at Pittsburgh, Chicago, and Oakland have been enlarged and improved and a new plant is under construction at Plano, Texas. This expansion is necessary to keep up with the growth of the electrical utility industry and the communications industry, which Hubbard and Company serves.

Hubbard's Electrical Materials Division has openings for specialists in lightning arresters, fuse cutouts, and other current-carrying electrical protective devices.

There are also openings for street lighting engineers to help meet the growing demands for aluminum street lighting standards and for aluminum and steel brackets.

Salaries and working conditions are good. Some traveling will be required. For the men we want, this is an opportunity for an excellent future.

If interested, please write to Richard G. Robbins, Vice President. Your inquiry will be held in confidence.

HUBBARD AND COMPANY

6301 Butler Street, Pittsburgh 1, Pa.

ROCKBESTOS A.V.C.®

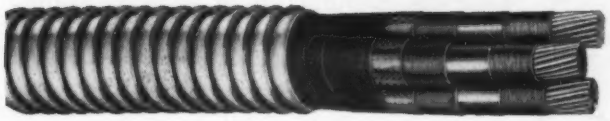
(N.E.C. TYPE AVA)

INTERLOCKED ARMORED CABLE

FOR **New Buildings**
Expanding Existing Circuits
Relocating Old Circuits

Rockbestos A.V.C. Interlocked Armored Cable gives you more current capacity than cable in conduit or other armored cable . . . is easily installed on racks or hangers beneath the ceiling or next to walls . . . can be installed up, down or around walls, beams or posts. It eliminates costly conduit and ducts . . . saves dollars on these materials . . . easier to install . . . cuts installation time . . . permits quick easy repairs.

Write for the new manual which gives application and design data for Rockbestos A.V.C. Interlocked Armored Cable.



ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT
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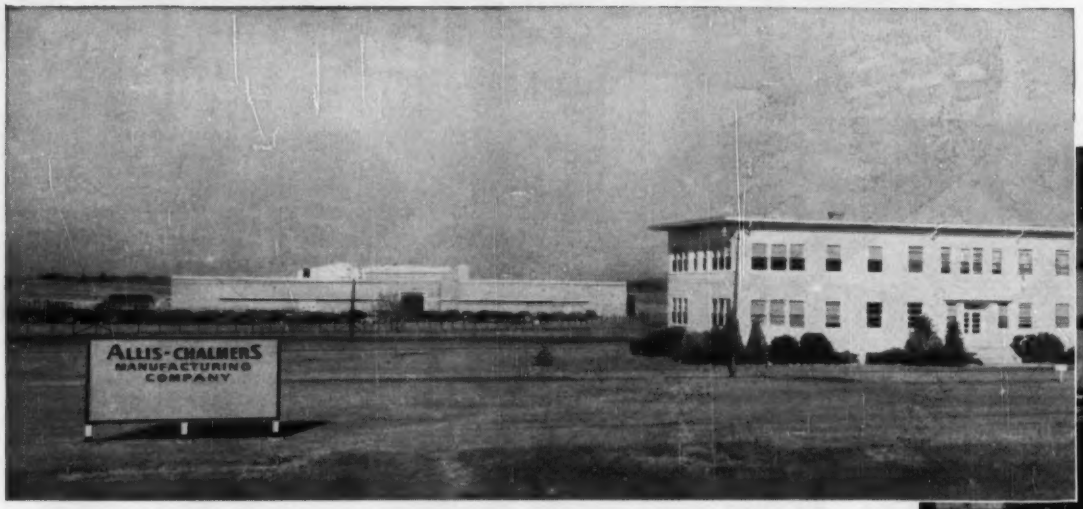
Large-Scale Transformer at Allis-Chalmers



Plenty of room for expansion at the Gadsden, Alabama facilities.

INCREASED production of pole-type distribution transformers at Allis-Chalmers Gadsden (Ala.) Works is good news to southern electric utilities. Now, this new plant puts every transformer user in the Southeast and Southwest within close shipping distance. By keeping Allis-Chalmers warehouses well stocked, Gadsden Works helps shorten supply lines to speed deliveries.

Allis-Chalmers Gadsden and Pittsburgh Works are teamed together to meet the increasing demand for quality controlled distribution transformers.

A-C Expansion Elsewhere

In addition to the new operations at Gadsden, Allis-Chalmers is now increasing facilities for the manufacture of electrical equipment in Pittsburgh, Boston, Terre Haute and Milwaukee.

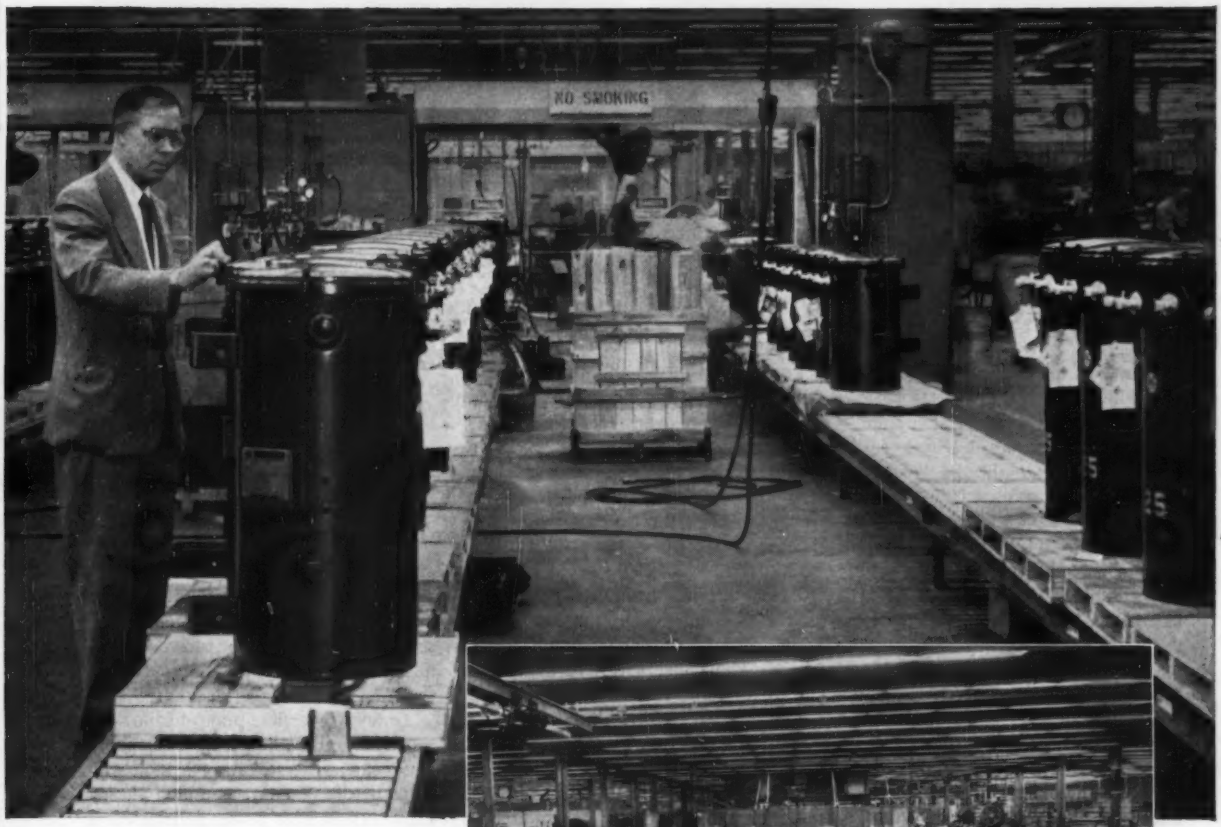
A-C ALLIS-CHALMERS

A-5100

ALLIS-

Production in Operation
Gadsden (Ala.) Works

New Facilities Supplement Pittsburgh Works in Manufacture of Pole-Type Distribution Transformers

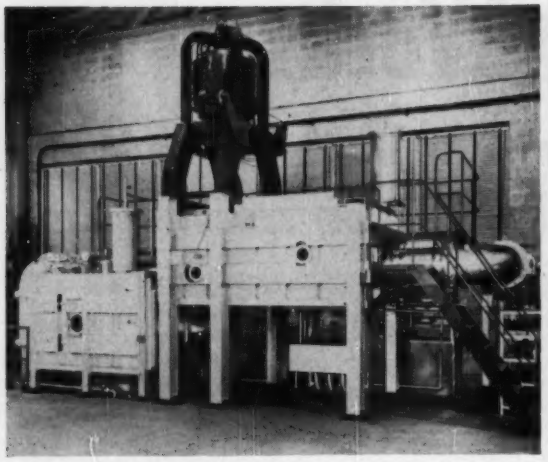


W. Damkoehler, Gadsden works manager, looks over distribution transformer ready for crating.

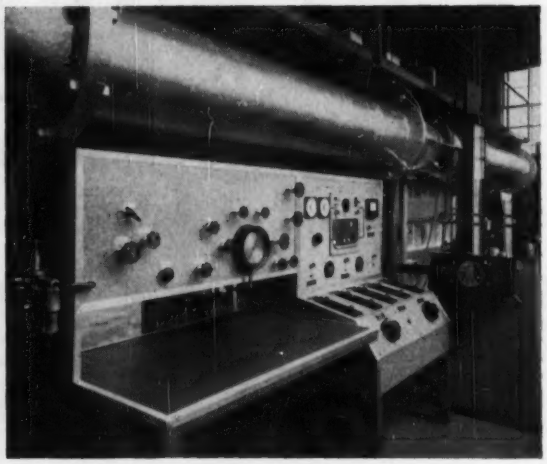
Core and coil assembly area for distribution transformers.

CHALMERS

GADSDEN WORKS
Gadsden, Alabama



Pump-Turbine Test Stand . . .



at BLH Lab to Speed Know-How as . . .

Prospects for Pump-Storage Get a Boost

Baldwin-Lima-Hamilton Corp recently bolstered its prospects for the growing market of reversible pump-storage projects. An addition to its Eddystone, Pa., hydraulic laboratory makes it possible to test runner models both as a turbine and a pump under a full range of operating conditions without changing the hydraulic set-up. According to BLH engineers, it's the first of its kind in U. S.

By extending facilities for testing scale-model reversible pump-turbines, the firm expects to speed up an accumulation of research results that will narrow the horsepower gap between pumping and power generation. Specific goals are better performance and improved cavitation.

The new test equipment, (left, front view) provides up to a 78-ft head at 2,000 rpm, and 75 to 100 hp depending on speed and head. The photo at right shows the control panel which is located behind test gear. At the bench are valve controls and dynamometer instruments; nearby are manometers and the beam scale for dynamometer.

Size of the model runner is 11 in. diam. Adjustable-pressure water circulation for the scale-model turbines originates in a service pump under the suction tank (small enclosure, left photo).

For turbine testing, a gate valve directs water flow to the 9⅓ x 5 x 3½-ft head tank, achieving the desired head. The water drops through to a draft tube into the 6½ x 5 x 4-ft suction tank, then down to the service pump for recycling. In pump tests, water is drawn from the suction tank to the head tank and returns to the suction tank. Butterfly valves at both ends of the test stand throttle flow downstream from a double-diffuser Venturi tube which measures flow in either direction.

The 16 x 10-in. Venturi tube (next to manometers, right photo) was calibrated for both directions of flow at the Alden Laboratory of Worcester Polytechnic Institute.

A 100-hp dynamometer atop the head tank measures turbine and pump horsepower. Water pressure is measured by manometers.

The circulating system is closed to atmospheric pressure. A small air-cushion chamber on the head tank permits adjusting the system's hydraulic gradient up or down as required without manipulating valves or pumps, BLH engineers said.

Today's reversible pump-turbine designs, although possessing reasonably good efficiency, still have a long way to go before equating pumping energy expenditures with power generation, a BLH spokesman said. "Only extensive research can improve this picture, a project in which the new facilities at Eddystone will play an important part by adding the essential factor of speed to the research," he added.

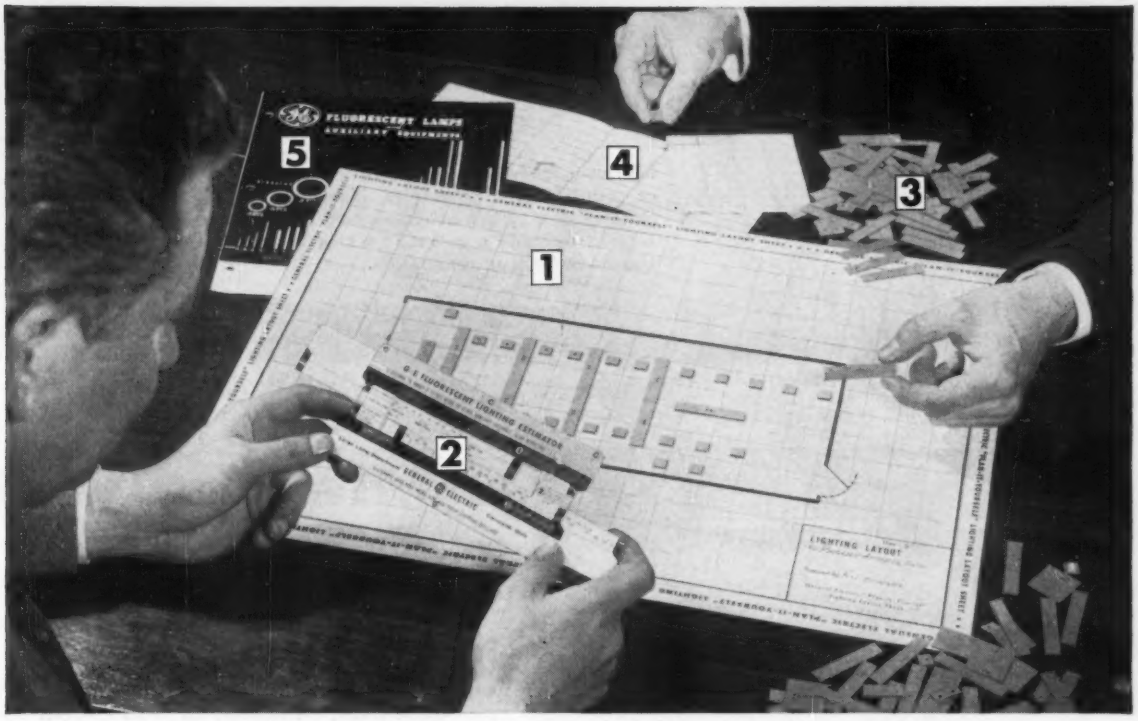
Glow Transfer Tube Times Sciaky Welder

Sciaky Bros. Inc., of Chicago has developed a precise timing control for resistance welder functions. The instrument which counts cycles of line frequency is reported to furnish the accuracy needed for precision welding.

Heart of the control is reported to be a cold cathode type glow transfer tube known as a "dekatron." This tube is constructed with a common anode and a multiplicity of cathodes. One type of tube is produced with 10 individual cathodes which have external connections. When power is applied to the tube, the glow is transferred from one cathode to another until the count is completed. One tube is capable of controlling many welder functions. By adding a decade dekatron, the count can be increased to 100; adding a third tube will increase the count to 1,000.

(*More M & M on page* 179)

GENERAL ELECTRIC ANNOUNCES A NEW LAYOUT KIT TO MAKE YOUR LIGHTING JOBS EASIER TO SELL!



Your General Electric "Plan-It-Yourself" Lighting Layout Kit contains (1) layout sheets, (2) a fluorescent lighting estimator, (3) movable, scaled "fixtures", (4) gummed "fixtures" for your permanent layout, and (5) a lighting design guide.

Send for your new G-E "Plan-It-Yourself" Lighting Layout Kit today. It will help your lighting prospects sell themselves.

The G-E "Plan-It-Yourself" Lighting Layout Kit is a brand new idea that makes your selling more profitable because:

1. It makes your selling easier. Your prospect helps sell himself because he is in on the planning. He can visualize his lighting needs more easily.

2. You can "sell up". Because your prospect sees *why* the new layout fits his needs, you can sell him a better lighting job. *You make more profit!*

3. You'll "close" more sales. Once the layout is complete, your prospect okays it. Your sale is half closed even before a complete cost estimate is made.

4. Order your sales-building "Plan-It-Yourself" Lighting Layout Kit Today! Use it to make your next lighting job more profitable—more fun! Costs only $1.75—contains enough material for a dozen lighting jobs. **Mail the coupon below,** or see your G-E lamp supplier.

TO: General Electric, Large Lamp Dept., W-E-7,
Nela Park, Cleveland 12, Ohio.

Gentlemen:

Please send me _____ new G-E "Plan-It-Yourself" Lighting Layout Kits @ $1.75 per kit. I enclose $_____.

SEND TO:_____
(Please Print)

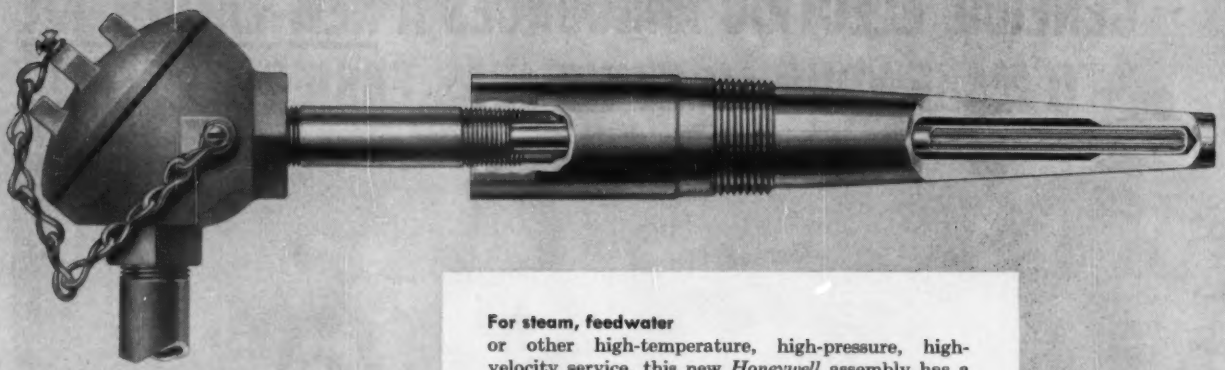
COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

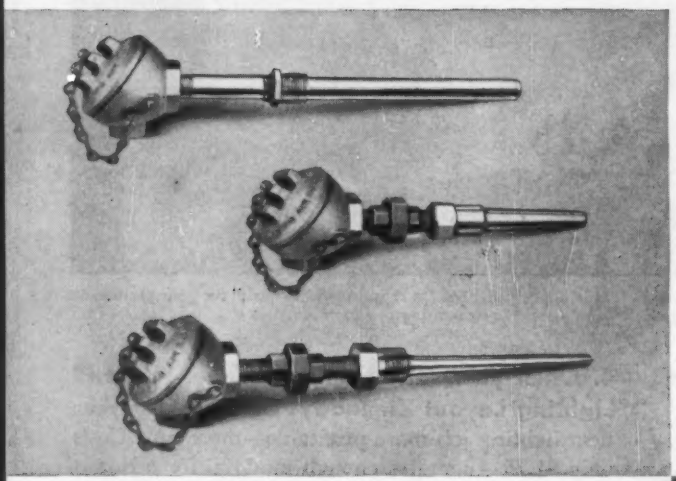
Progress Is Our Most Important Product

GENERAL ELECTRIC



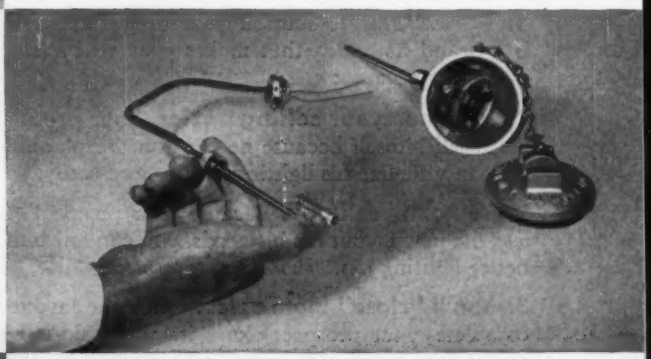
For steam, feedwater
or other high-temperature, high-pressure, high-velocity service, this new *Honeywell* assembly has a tapered well and a ceramic packing to protect the thermocouple against vibration.

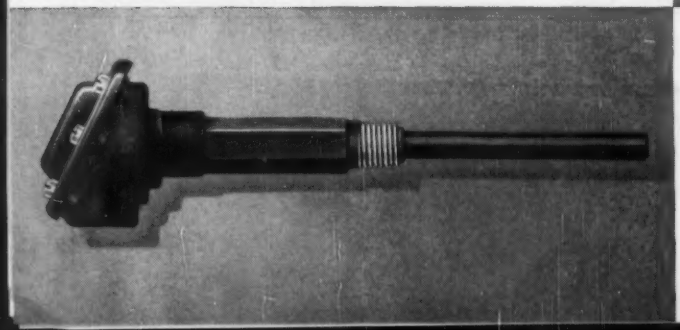
. . . with



Typical steam plant thermocouples
include (at top) a design for boiler gas and air temperatures and for turbine exhaust; (center) for economizer water; (at bottom) for boiler gas, air, or turbine exhaust.

Turbine bearing temperatures
are sensed by spring-loaded thermocouples in stainless steel assemblies.





For diesel engine cylinder exhaust
temperatures, these assemblies with rigid or flexible connections resist corrosion and oxidation when installed in exhaust manifolds.

You can measure all critical temperatures

Honeywell thermocouples

FOR THE precision temperature measurements such as—steam, water, flue gases, air, bearings, oil, hydrogen, transformers—needed by power plants, Honeywell has a complete line of thermocouples from packed elements in tapered wells for high-pressure, high-temperature steam, to bare wire peened into boiler tube walls. Typical assemblies are shown here.

Honeywell thermocouples are easily installed and provide long, reliable service. Measuring elements can be quickly replaced in wells with complete safety.

Accuracy of Honeywell thermocouples is assured by constant quality control checking. Every spool of wire used in their production is calibrated against laboratory standards at several points throughout the entire temperature range over which they will be used.

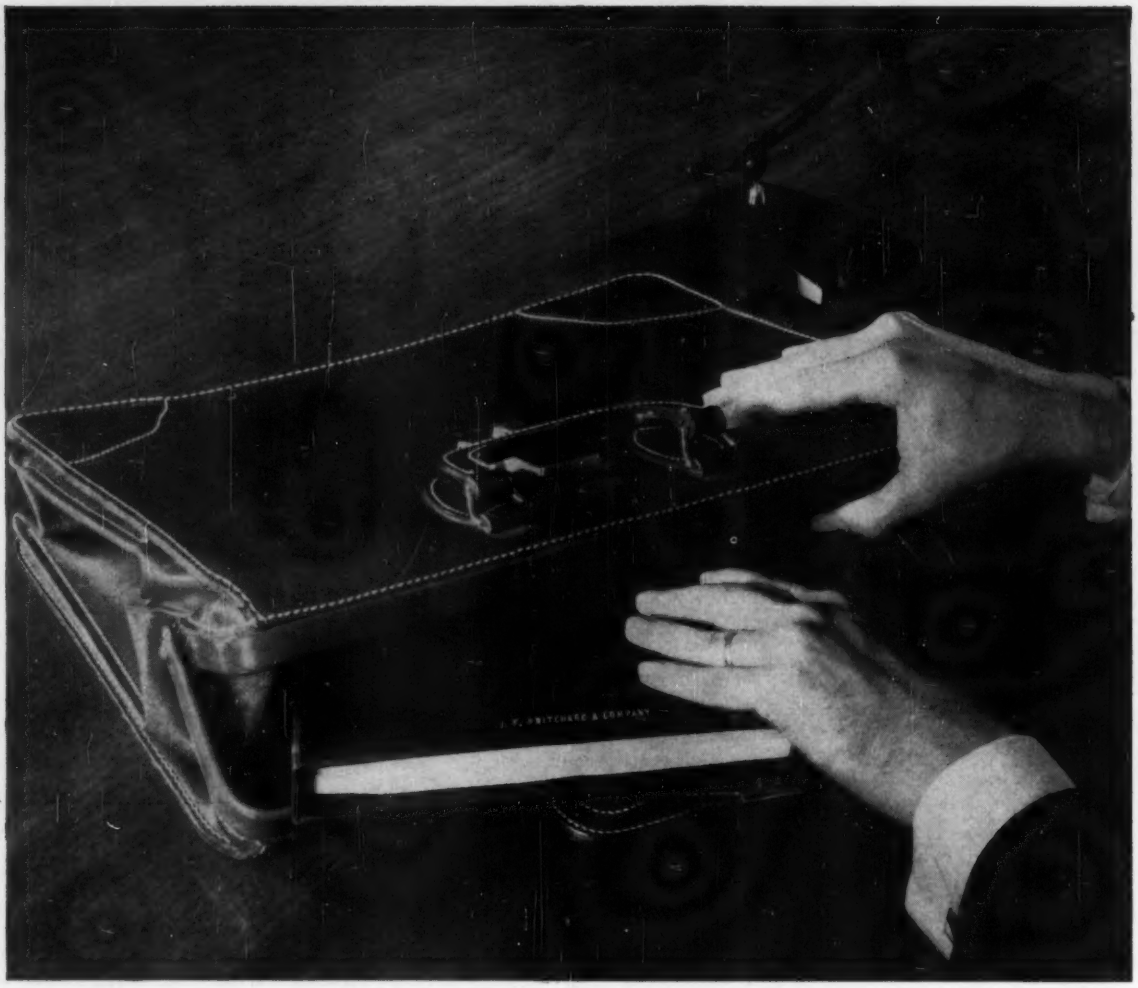
These thermocouples will actuate an equally complete and versatile line of *ElectroniK* recorders and indicators. Many thousands of these instruments are giving sensitive, precise performance with minimum service requirements in industrial plants throughout the world.

To learn more about how your plant temperature measuring problems can be solved, call your local Honeywell sales engineer . . . he has the answers, and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● REFERENCE DATA: Write for Bulletin 9050R, "Instrumentation for Steam Generation"... and Bulletin 9070, "Instruments for Electric Power Generation."

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls



"Contract signed with Pritchard—and with complete confidence"

"I know you've been working with them on plans for the new power plant, but why are you so pleased?"

"Because this is a Pritchard Single Responsibility Contract."

"What kind of a contract is that?"

"It means that Pritchard has taken full responsibility for everything—engineering, design, drafting, purchasing and construction."

"Oh, I see! This way you are dealing with just one company and not a lot of different ones. Is that it?"

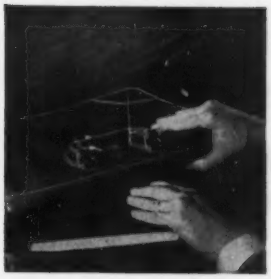
"Yes, but just part of it. With this contract, we know what the total cost of the plant is going to be before it's started. Pritchard co-ordinates all of the buying. They save us money on labor. And we get a firm guarantee of operation of the completed power plant. One more very important thing—perhaps the most important . . ."

"What's that?"

"We start getting a return on our investment faster because the construction job gets done faster."

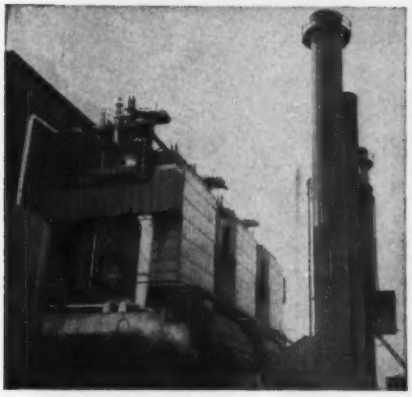
"I can see now why you feel so good about that contract."

J. F. PRITCHARD & CO.
4625 Roanoke Parkway, Kansas City 12, Mo.



"Contract signed with Pritchard—and with complete confidence."

Three reasons why Pritchard is the choice for power plant design and construction!



Three *big reasons!*

One, Pritchard ability and experience. Unrivaled in the field. Ready to go to work for you now!

Two, Pritchard ability to work *with* your staff on every step from drawing board to completion!

Three, Pritchard's time-saving, money-saving, Single Responsibility Contract!

Three big reasons why—when you plan to build, expand or modernize—it will be wise to include Pritchard in those plans!

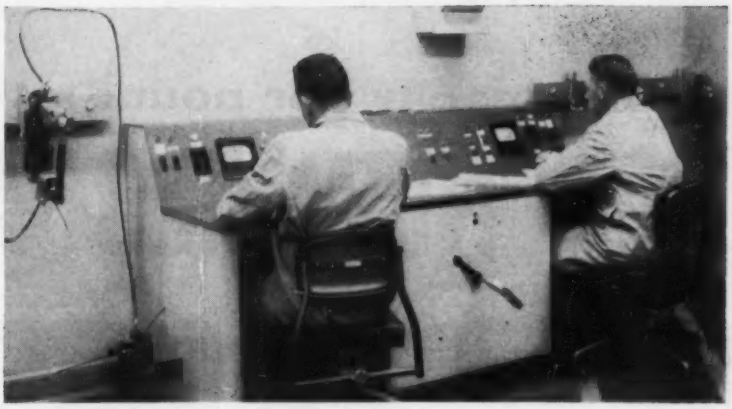
YOUR INQUIRY IS INVITED

If you would like more information on Pritchard's Single Responsibility Contract, simply write on your company letterhead. Of course, there is no obligation.

INDUSTRY'S PARTNER FOR PROGRESS

J.F. Pritchard & Co.
ENGINEERS • CONSTRUCTORS
Dept 533 4625 Roanoke Parkway
Kansas City 12, Mo.

SERVING THE GAS, POWER, PETROLEUM AND CHEMICAL INDUSTRIES
BOSTON, CHICAGO, BUFFALO, HOUSTON, NEW YORK, PITTSBURGH



Chance Readies 2-Element Fuse Links

These engineers of A. B. Chance Co, Centralia, Mo., are running a verification test of time current characteristics on product samples of new transformer protecting dual element fuse links. The fuse links are being made available to the electrical industry this week.

The laboratory tests were conducted at the Chance Co's St. Louis plant where fuse links are manufactured. "The final tests," the company declared, "culminate an extensive development program of an entire range of fuse links designed to give complete protection to the distribution transformer and electrical system."

Turbines Spin at 1,240 F With GE's Nickel Alloy

A vacuum-melted nickel-base alloy used in forged buckets of land gas turbines has proved suitable for operation under load at temperatures of 1,240 F. This was recently revealed by metallurgical products engineers of General Electric Co.

Designated M-252, the alloy's strength factors and resistance to thermal shock, the engineers said, will bring applications in 12 turbines now being built: Two 16,000-kw units, five 5,000-hp type and 7,600-hp type for pipeline pumping. Four 7,600-hp gas turbines already in use, operate at 1,240 F at 6,900 rpm, they stated.

Line Hardware Prices Up

A build-up since 1954 of steel, labor and transportation costs finally set off a round of pole line hardware price increases earlier this month. First to announce the news was Hubbard & Co who upped most items 10% and boosted copperweld ground rods and accessories about 7½%. Later in the same week, Line Material Co and A. B. Chance Co made comparable price hikes. Company spokesman said the increase was the first in two years.

Aims for Quick Aging Data on Wire Enamel, Varnish

Electrical industry's demand for long-lived wire enamel and insulating varnish systems was the reason for Schenectady (N.Y.) Varnish Co's new electrical testing and development laboratory. This was announced recently by J. W. McHugh, the firm's vice president.

Laboratory testing devices, operating at 150 or 200 C, are expected to provide reliable aging data on new Class B resins and varnishes, McHugh said. The equipment will determine life-expectancy in 4 to 6 months instead of 30 years or more study at normal 135 C operating temperatures, he added.

(*More M & M on page* 182)

Most capacity per pound of weight with the

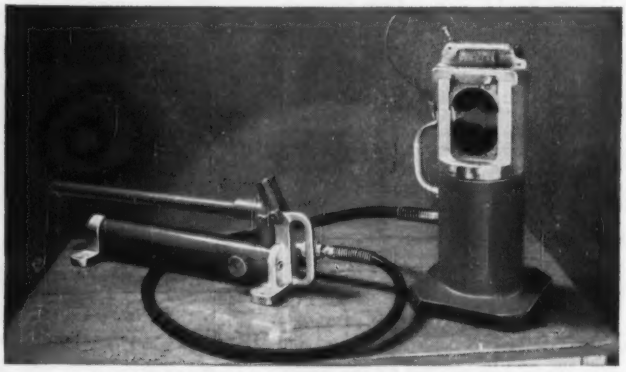
NEW ALCOA 60-TON

PORTABILITY is a main feature. Man on right carries compressor and stand; man in center has gasoline-engine pump, 60 pounds; man on left carries connecting hose and accessories.

FAST ACTING compressor made three complete compression joints on 3/0 ACSR, including cutting conductor and trimming aluminum strands, in 23 minutes.

TWO-STAGE HAND PUMP increases speed of compression. Unit pumps fast until die pressure builds up. Manual release valve plus spring-loaded piston gives quick retraction.

HEAD LOCKS in position, can't fall out, unlocks at press of finger. Dies also lock in position, release at push of button.



COMPRESSOR rests in simple stand for ground work. Accessible handles on pump and compressor simplify operating and carrying. Spring guards protect hose.

COMPRESSOR

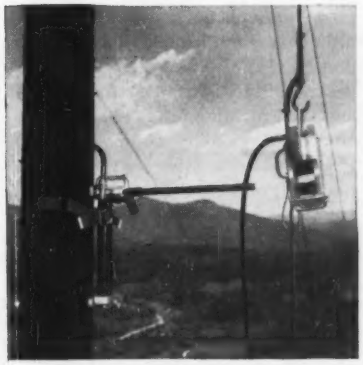
- **PORTABLE**
- **FAST ACTION**
- **LARGE RANGE OF CONDUCTOR SIZES**

A thrust of 60 tons in a tool weighing only 42 pounds is now possible with the new Alcoa® 60A Compressor. Designed to apply compression fittings on ACSR or stranded aluminum conductors up to two inches in diameter, the new compressor offers more versatility than any other tool available today. Hand- or power-operated pumps are available for the compressor. For more information on the model 60A compressor, contact your Alcoa representative or write Aluminum Company of America, 2306-U Alcoa Building, Pittsburgh 19, Pa.

Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

THE ALCOA HOUR—Television's Finest Live Drama, Alternate Sunday Evenings



HOISTING BAIL for hand line is a permanent part of compressor unit. Flexible steel cable prevents accidental dropping of head when placing compressor over fitting.

ONE MAN handles compressor, other operates gasoline-engine pump. Power pumps have been used 75 ft from the compressor.

SIMPLICITY with light weight is chief advantage of new Alcoa 60A Compressor. Pump and compressor operate in any position; use SAE 10 motor oil.

get your man!

ELECTRICAL WORLD's audience is everyone concerned with generation, transmission, distribution and utilization of electricity in large amounts—25,000 *all-paid* subscribers! In utilities and big industry, among electrical manufacturers and consultants . . . only World covers the entire Electric Power Industry. Like to know more, in easy dosage? Write for "Quick Facts" . . . Electrical World, 330 West 42nd St., New York 36, N. Y.

Smaller, Brighter Bulbs Slated by Westinghouse

Improvements in three-way bulb design and introduction of a new 100/200/300-w size were announced recently by Westinghouse Electric Corp.

The design changes include reduced size, a filament structure producing 10 to 15% more light, and an electrostatic, glare-reducing coating, company engineers said. Dealers will receive the lamps in August.

A-C's Transformer Manual

Allis-Chalmers Mfg Co has prepared a training manual to acquaint engineers on the company's graduate training course on transformers. It provides basic information on Allis-Chalmers Pittsburgh (Pa.) Works and its products. Subject contents include: General theory; unit substations; distribution, network, power and instrument transformers; industry standards; and bibliography. Of interest to electrical supervisors, the manual may be obtained by request on company letterhead to A-C, Industrial Press, Box 512, Milwaukee 1, Wis.

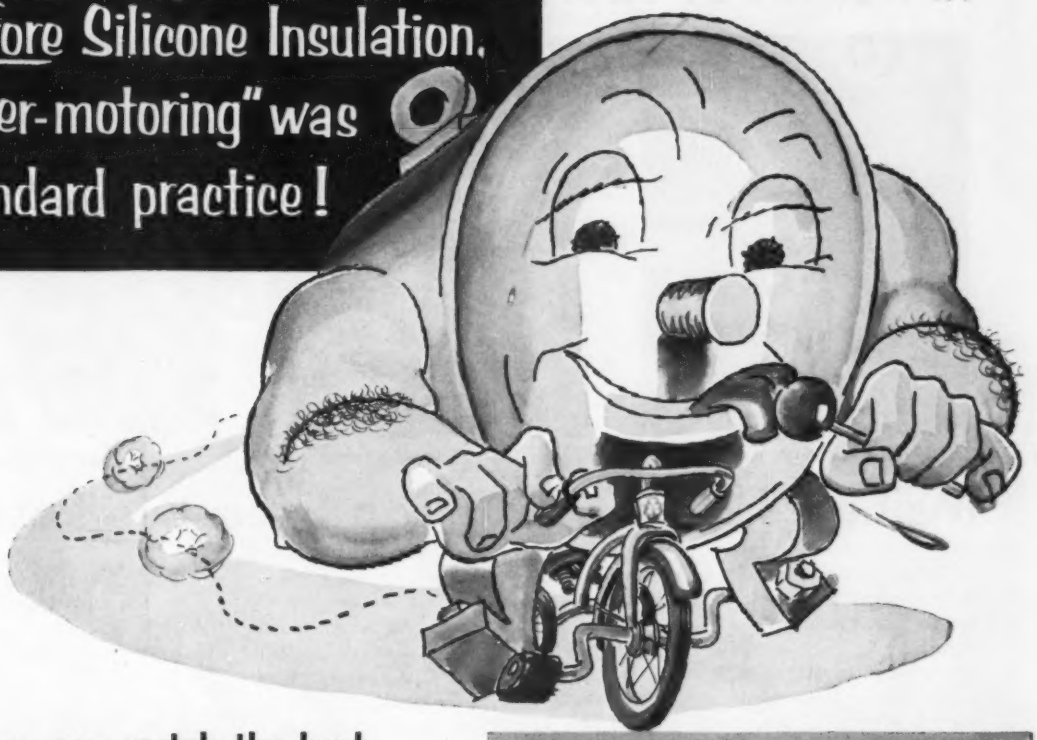
M&M BRIEFS

Wilbur B. Driver Co, resistance wire manufacturer, recently opened a larger warehouse and office at 13701 Enterprise Ave, Cleveland 11, Ohio.

General Electric Co's chemical materials department in Pittsfield, Mass., announced price increases for most grades of phenolic laminating varnishes (1¢/lb); phenolic molding compounds (1½¢/lb on volume orders of general-purpose to 3¢/lb for special); and shell molding resins (2¢ per lb included in molding compound rise). Higher material, labor and transportation costs brought the change, GE said.

Calumet & Hecla, Inc., Chicago, has established a wholly owned subsidiary, Calumet & Hecla of Canada, Ltd., which will be located in London, Ontario. This will represent an investment of more than $7.25 million. A new mill for manufacture of tubular copper products is scheduled for completion prior to Dec. 31, 1957.

Before Silicone Insulation, "over-motoring" was standard practice!



Now you can match the load . . . let silicones carry the overloads

Lazy motors cost money! Why continue to pay a fat premium for motors that make kid's play of their average work load? Today, you can save money by using *silicone insulated* motors rated to *match your average load.* Their built-in service factor of 25 to 50% will handle most intermittent overloads or loads that can't be matched in standard frame sizes.

Cut your capital investment and installation costs! Think of it—for every dollar dumped into *unused* motor capacity, you spend an extra $3 for starters, cable, transformer capacity and installation costs.

Enjoy more continuous production! You can depend on motors insulated with Dow Corning silicones to have maximum resistance to such motor killers as heat, moisture and corrosive atmospheres.

Remember, over-motoring is outmoded

Get sources for silicone insulated equipment—mail coupon today

Dow Corning Corporation, Dept. 4407, Midland, Mich.

Please send me sources of supply for new Silicone (Class H) ☐ Motors ☐ Transformers

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE ____ STATE _____

Rolling up more evidence...

R. G. LeTourneau, Inc. of Longview, Texas, installs a silicone insulated d-c motor in each of the 24 electric wheels of the giant "Sno-Freighter." Silicone insulation is used to give maximum power per pound under tough operating conditions. The silicone insulated motors, located in tubular axles and connected through a gear train in the wheel hubs, demonstrate the advantages of placing the power unit close to the work . . . a basic principle made practical by the heat stability of Dow Corning silicone dielectrics.

DOW CORNING SILICONES

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

ATLANTA • BOSTON • CHICAGO • CLEVELAND • DALLAS
DETROIT • LOS ANGELES • NEW YORK • WASHINGTON, D. C.
(Silver Spring, Md.)

CANADA: Dow Corning Silicones Ltd., Toronto
GREAT BRITAIN: Midland Silicones Ltd., London
FRANCE: St. Gobain, Paris

LAWRENCE H. ALLINE

SAMUEL W. COLLINS

C. HAZEN STETSON

Maine PS Names 3 to Top Executive Posts

Recent executive changes at Maine Public Service Co include the election of former president Lawrence H. Alline as chairman of the board and the appointment of Samuel W. Collins as president of the company. C. Hazen Stetson has been named executive vice president, a new position in the Maine utility.

Alline, president since October, 1935, is an electrical engineering graduate of Purdue University. With the exception of two years as a commissioned officer in the U. S. Army Corps of Engineers during World War I, he was transformer sales engineer and sales manager for Packard Electric Co from 1915 until 1926. He then was appointed general manager of Gould Electric Co. Through his efforts, other companies in the Presque Isle vicinity were acquired and merged with the Gould utility, forming Maine Public Service. Alline continued as general manager until his election to the presidency.

Collins, who became a director of the Maine utility in 1947, has been president of the Aroostook Trust Co for the past 15 years. He has been active in the lumber, construction, and banking fields in northern Maine since his graduation from the University of Maine in 1919. Collins also served six terms in the Maine legislature, including four years as a state senator.

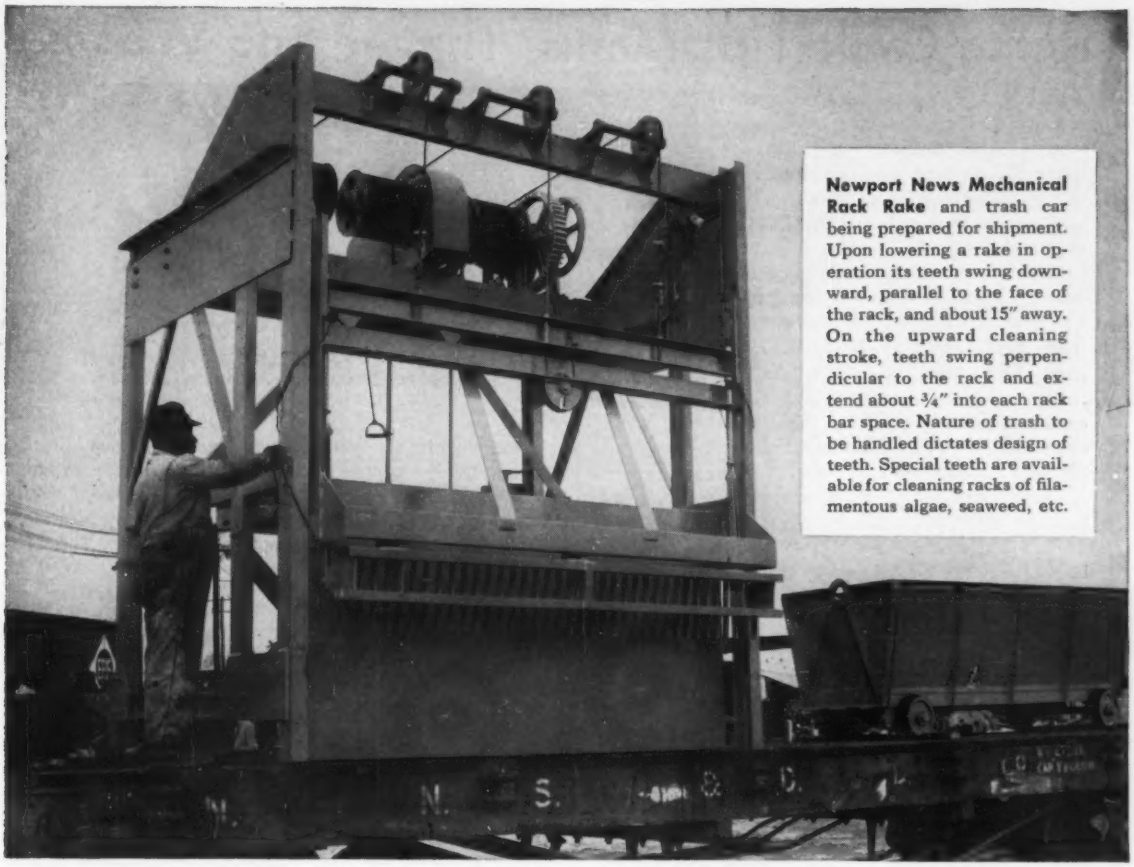
Active in the utility field since 1923, Stetson has served as Maine Public Service vice president since 1951. His utility experience began in the accounting department of the Haverhill (Mass.) Gas & Light Co, and he served as its chief accountant from 1930 to 1937. He then became chief clerk of Maine Public Service. From 1942 to 1946 he was office manager and chief accountant of Central Indiana Gas Co. Returning to Maine Public Service, Stetson became assistant treasurer, and from 1947 to 1951 he served as the company's secretary and clerk. He was named treasurer of Maine Public Service in 1948, and vice president in 1951.

Brooks Is Elected VP of 6 AG&E Subsidiaries

New vice president of American Gas & Electric Co's six operating subsidiaries is Paul D. Brooks, who also remains in his former capacity as commercial vice president and director of American Gas & Electric Service Corp. Subsidiaries comprising the seven-state system are Appalachian Electric Power Co, Indiana & Michigan Electric Co, Ohio Power Co, Kingsport Utilities, Inc, Kentucky Power Co, and Wheeling Electric Co.

Brooks, a 28-year veteran in the electric utility field and a graduate of the University of Tennessee, joined AGE Service Corp in 1953. He started his utility career with Tennessee Public Service Co in 1928 as a commercial sales engineer, and was named rural department supervisor the next year. His appointment as manager of one of the company's operating divisions in 1932 was followed four years later by his promotion to general sales manager. In 1938, Brooks joined Ebasco Services, Inc, as sales sponsor. He became assistant manager of the sales and marketing department in 1944 and department manager in 1950.

PAUL D. BROOKS



Newport News Mechanical Rack Rake and trash car being prepared for shipment. Upon lowering a rake in operation its teeth swing downward, parallel to the face of the rack, and about 15" away. On the upward cleaning stroke, teeth swing perpendicular to the rack and extend about ¾" into each rack bar space. Nature of trash to be handled dictates design of teeth. Special teeth are available for cleaning racks of filamentous algae, seaweed, etc.

Positive cleaning action calls for guided rack rakes

Excessive loads of trash cannot push a Newport News rake away from the racks.

And there's no chance of the rake *riding over trash* on the upward cleaning stroke. Nor will its teeth drop the debris. Because Newport News builds the rake to operate in channel guides... for *positive cleaning action.*

That's why efficient rack cleaning assures the maximum head at intakes and is yours when you put a rugged and dependable Newport News Mechanical Rack Rake on the job.

Maximum width of a single rake is determined by design of the forebay. Where a single bay is extremely wide, intermediate guides are sometimes installed to reduce width of the rake. Such installation is relatively inexpensive.

A power-operated Newport News Mechanical Rack Rake, under ordinary conditions, enables one man per shift to keep racks clean for a dozen bays, from 5'-6" to 28'-6" in width.

Trash is cleaned from the rake manually, or by a mechanical "sweep", into a flume, a car or onto a trash apron. Local conditions and nature of the trash dictate method of disposal. The many typical installation arrangements fit most needs, but each installation is a custom built job.

We invite inquiries from water users who are troubled with trash. Write for your copy of "RACK RAKE", an illustrated booklet describing the operation and advantages of the Newport News Mechanical Rack Rake.

Newport News
Shipbuilding and Dry Dock Company
Newport News, Virginia

Rome Cable Ups Marks, Thayer, and Woods

Frederick S. Marks, sales manager of Rome Cable Corp since 1951, has been elected treasurer to succeed Harry W. Barnard who continues as vice president, finance. Newly appointed sales managers are Dwight H. Thayer and John R. Woods.

Marks' career in the wire and cable industry began with employment by Rome Wire Co upon his graduation from Yale University in 1926. He joined Rome Cable in 1945 as southeastern sales representative, and was appointed sales promotion manager of the firm in 1949. He became assistant sales manager the next year.

Thayer has served as advertising manager since he joined the firm in 1945. A graduate of Clark University, he was previously employed by Rome Wire Co and associated with its successor company, General Cable Corp, for 19 years.

Woods, former Pittsburgh sales representative, joined the company's inspection department in 1941, and was subsequently named assistant chief inspector. Since his 1950 assignment to the sales department, he has been affiliated with district sales offices in Michigan, metropolitan New York, and Pittsburgh.

F. S. MARKS D. H. THAYER J. R. WOODS

PERSONAL BRIEFS

C. W. De Voe, chief accountant, has been elected assistant comptroller and assistant treasurer of San Diego Gas & Electric Co . . . Connecticut Light & Power Co has named **Julian P. Morgan** farm service representative of its Northern Division.

L. B. Wheaton has been appointed superintendent of Columbus & Southern Ohio Electric Co's meter division to succeed **J. N. Schwartz** who has retired after 47 years' service. **Donald E. Bootes,** former Dayton Power & Light Co home service director, has joined C&SOE as residential sales manager as successor to **Kenneth M. LaRue.**

New president of Michigan Electric Association is **H. Stanley Richmond,** vice president of Consumers Power Co . . . **William F. Ryan,** vice president and senior consulting engineer of Stone & Webster Engineering Corp, has been nominated to serve as 1956-57 president of American Society of Mechanical Engineers . . . Illuminating Engineering Society's newly elected president is **Marshall N. Waterman,** assistant commercial engineering manager of Westinghouse Electric Corp's Lamp Division.

Retirement of **E. E. Royer** as vice president and general manager has been announced by Washington Water Power Co.

Gulf States Utilities Co has named **H. E. Brown,** operations manager in Beaumont, as Baton Rouge Division operations manager. **J. B. Coltharp,** Beaumont operating superintendent, succeeds Brown, and **Floyd R. Smith** moves from operating superintendent, Port Arthur Division, to Coltharp's former post. **R. Earl White,** engineering supervisor at Baton Rouge, replaces Smith.

Alabama Power Co has promoted **J. A. Griffith** from Birmingham Division meter superintendent to senior engineer in the division's distribution department. His successor is **W. A. Jordan,** former supervisor of tests.

John F. Thomas, Pennsylvania Power Co senior district representative, has been appointed to the newly created post of Zelienople district manager, and **Richard W. Walker** becomes line supervisor in the district.

William J. Higgins has been appointed to the newly created staff position of manager of systems and co-ordination of Line Material Co. Assuming his former duties as personnel manager is **Fred W. Burtner.**

New vice president of merchandising for Radio Corp of America is **Martin F. Bennett,** former director of RCA regional operations . . . **Charles C. Bonin** has been named engineering manager of Ebasco Services, Inc. **H. K. Fairbanks** is new Ebasco chief concrete-hydraulic engineer, and **G. F. Latham** becomes chief architectural-structural engineer.

Herman F. Lehman has been elected a vice president of General Motors Corp and general manager of its Frigidaire Division to succeed **Mason M. Roberts** who is retiring. **C. H. Menge** assumes Lehman's former post of division general sales manager.

OBITUARY

Frederick L. Witsell, 59, vice president of employee relations since 1948 at Public Service Co of Colorado, died in Denver after a brief illness.

Charles L. Campbell, 79, former president of Connecticut Light & Power Co, and later chairman of the board, died recently.

John H. Aiken, 61, retired vice president of Consolidated Edison Co of New York, Inc, until his retirement early this year, died recently after a long illness.

F. Carter Womack, 59, chairman of the board and president of El Paso Electric Co, died recently.

Savannah Electric and Power Reports:

TROUBLE-FREE COMMUNICATIONS FOR FOUR YEARS WITH GENERAL ELECTRIC TWO-WAY RADIO

For the past four years, the Savannah Electric and Power Company has depended upon trouble-free G-E two-way radio to coordinate maintenance, transmission, and construction crews throughout a five-county, fifty-mile city radius.

General P. E. Seawright, Superintendent of Transmission and Distribution for Savannah Electric and Power, reports his organization has never experienced a serious break in two-way radio communications, during four years of operation. He credits General Electric's dependable equipment, teamed with a maintenance program provided by the local General Electric Authorized Service Station, for assuring his firm of full 24-hour radio services.

Radio Cuts Service Loss Time

Seventeen mobile units in the fleet of service and supervisory vehicles are coordinated by radio from the office of General Seawright, in the Savannah office.

General Seawright credits the G-E two-way radio system for speedy assists in the restoration of service in emergencies. This is a vital factor to the thousands of homes and commercial installations over 1000 miles of line.

New Progress Line Radio

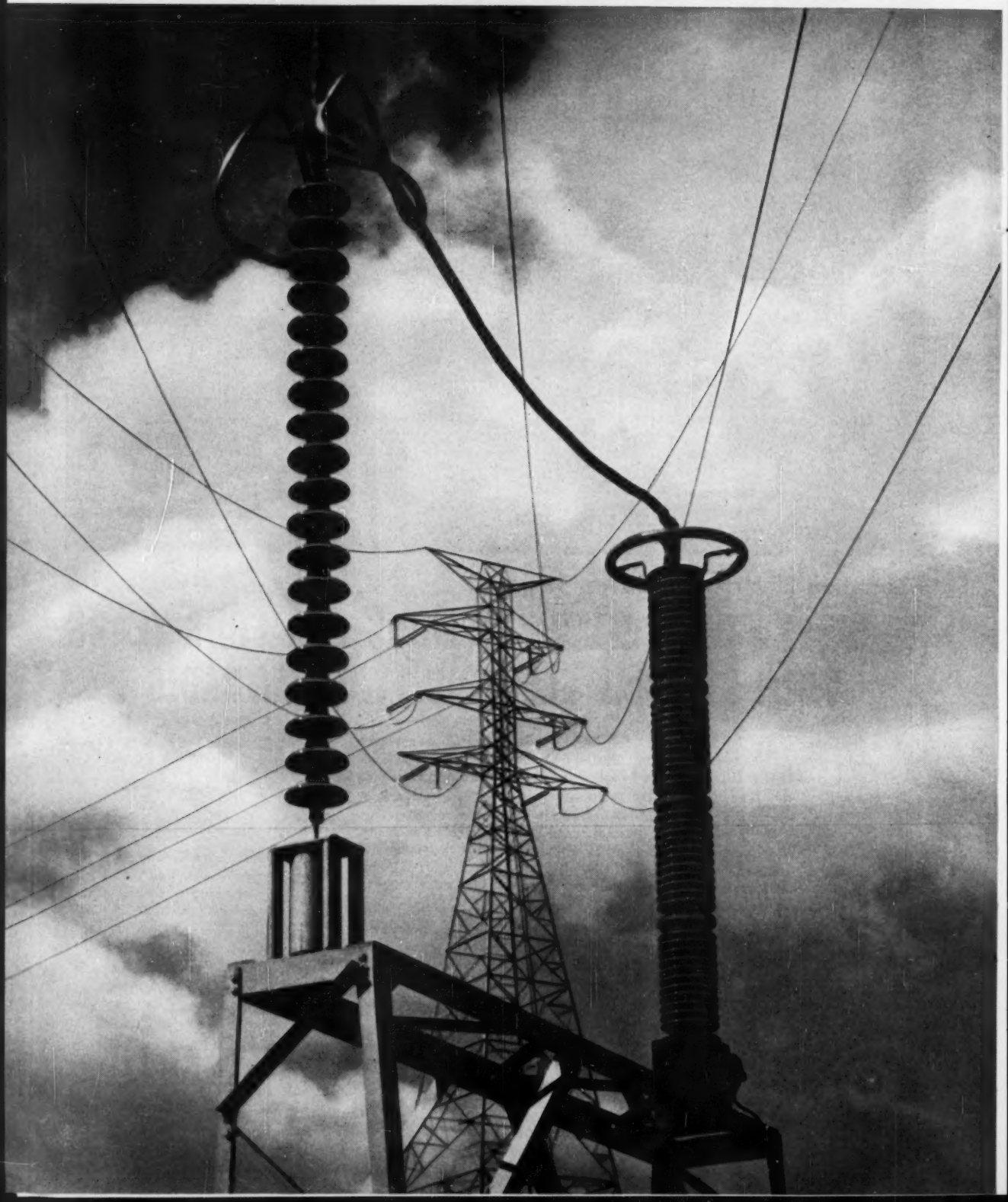
General Electric's new Progress Line radio provides full chassis, interchangeability, plug-in chassis, and new 6600 series tubes, specially designed and tested for radio communication circuits.

Your Communications Counselor can give you full details. Call him in, or, write: *General Electric Co., Communication Equipment, Section X1976-23, Electronics Park, Syracuse, N. Y.* In Canada, write: *C.G.E. Electronics, 830 Lansdowne Avenue, Toronto.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

For the Mass



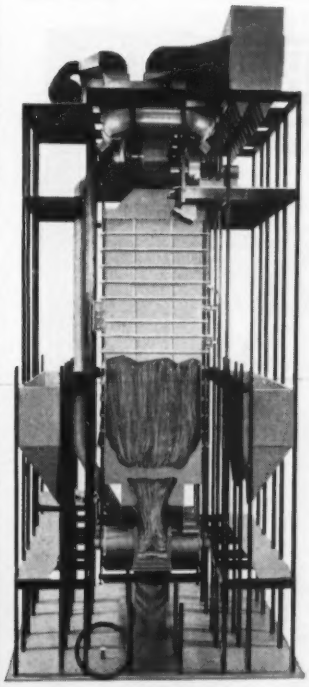
Production of Energy

"AMERICAN GAS AND ELECTRIC SYSTEM looks for a higher level of efficiency in the production of electric power than has ever been achieved before."

This firm prediction by Philip Sporn, president of the American Gas and Electric System, refers to the two largest steam-electric generating units in the world, which are to be added to the facilities of AGE.

Second and Third Universal Pressure Units for AGE

Each unit will produce 450,000 kw, enough power to supply the residential need for a city of 4,000,000 people—*more electricity than many complete utility systems.* Steam generators for the two units are of the B&W Universal Pressure type, and will be the second and third to go into commercial service. The first will start producing power at Ohio Power's Philo Plant in the near future.



Cyclone Furnace-fired B&W Universal Pressure Steam Generator to serve 450 MW turbine. Design pressure 4500 psi. Generates 2,900,000 pounds of steam per hour at 3625 psi, 1050 F. There are two stages of reheat to 1050 F. The second unit is similar in design but will be pulverized-coal-fired. Note comparison with six foot man standing at basement level.

Coal the Main Energy Source for Years Ahead

The decision to go ahead with these super-pressure, coal-fired units is based upon the fact that the bulk of our energy, for many years ahead, will come from coal, burned efficiently with economical equipment.

Two Firing Methods Utilized

Each of the B&W Universal Pressure Units will generate 2,900,000 lb of steam per hour. One will be Cyclone Furnace-fired and the other pulverized-coal-fired, to take greatest advantage of the method better suited to fuel and operating conditions in each case.

It takes courage and confidence in their engineering ability for AGE to initiate these world's largest generating units—and this confidence is reinforced by the work of the B&W organization and by previous experience with B&W research, engineering, manufacturing, field development and erection. These capabilities, skills and facilities are the real resources of B&W. For nearly 100 years they have been dedicated to serving the current and future steam-electric power needs of the nation.

The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

BABCOCK & WILCOX

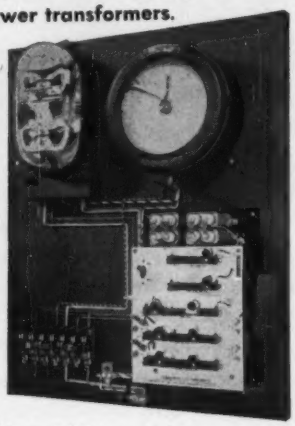
B&W

BOILER DIVISION

G-812

Transformer Loss Compensator Saves you Money!

BECAUSE it provides an accurate means of measuring the energy and demands of high-voltage services at the low-voltage side of the power transformers.



This installation at 2.3 kv saved about $2600 compared with 34.5 kv metering; it saves about $5500 over metering at 69 kv.

THE TESCO compensator adds to the registration of the watthour meter an amount equal to the sum of the iron and copper losses of the transformer bank. It may be used with practically any type of watthour meter and . . . importantly . . . no changes are made in the meter itself, either structurally or in adjustments . . . It is produced in two and three element types for use with two-element or three-element meters on any type circuit.

Some of the Users . . .

Phila. Electric Co. Penna. Power & Light Co. Texas Power & Light Co. U. S. Bureau of Recl. Public Service Co. of New Hampshire. Utah Power & Light Co. Northern States Power Co.

Get your book now FREE

Detailed information on operation, installation, applications. Write for Bulletin NO. 63-A.

EASTERN SPECIALTY CO.

PHILADELPHIA 40, PA.

SALES ASSIGNMENTS

COMPANY STAFFS

Clark Brothers Co, member of Dresser Industries, Inc, has appointed James B. Hickey sales engineer of the Washington, D. C., office to replace William E. Dobbins, recently named central regional sales manager.

General Electric Co's Construction Materials Division has named William D. Keleher and Otto W. Drager as district representatives. Keleher, previously commercial service supervisor for the division's San Francisco office, will handle wiring device accounts in the San Francisco trading area. Drager moves from supervisor of the division's Seattle Regional Warehouse to representative for wiring devices, conduit products, and wire and cable in the Seattle, Wash., territory.

Infilco, Inc, has promoted former service engineer R. W. Schneider to field sales engineer for Indiana, Michigan, and Ohio. He replaces J. P. Manger who was transferred to Tucson to work in sales project engineering. . . . Ed Crowley is new representative for the southeastern states.

Minneapolis-Honeywell Regulator Co's Industrial Division has named K. Russell Knoblauch sales manager for the oil and chemical industries, eastern region. Territory includes the mid-Atlantic, eastern, southeast, central, and midwest states.

Line Material Co's new sales office and warehouse in Spokane, Wash., is headed by W. F. Smith, division manager of the Mountain States Division. The new facility will service customers in Montana, eastern Washington, and northwestern Idaho.

Robertshaw-Fulton Controls Co has appointed George L. Leupold assistant general sales manager of its Fulton Sylphon Division, with headquarters in Knoxville, Tenn.

Sylvania Electric Products, Inc, has opened a new regional warehouse and sales office at Denver. James A. Tilson, formerly assistant manager of distribution services, Kansas City, Mo., becomes manager of the warehouse which serves dealers in Colorado, Wyoming, Utah, and parts of Nevada, Idaho, Montana, South Dakota, Nebraska, New Mexico, and Arizona. William A. Cummings is new district sales manager.

Westinghouse Electric Corp's Apparatus Division, southwestern region, has named H. J. Kongabel Mississippi valley district manager, St. Louis; F. N. Wightman, Oklahoma manager, Tulsa; and V. O. Clements, south Texas manager . . . Chicago office has appointed Harry T. McKay management sales representative and Gordon M. Bartage as area manager . . . W. R. Cooney is new Pacific Coast regional manager of portable appliances.

INDIANA STEEL & WIRE CO. Muncie, Ind. Crapo Galvanizing

Signs along the lines of *Crapo* **GALVANIZED STEEL STRAND PERFORMANCE**

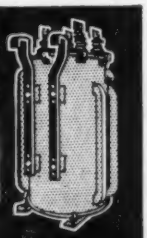
For dependable performance . . . insist upon *Crapo* Galvanized Steel Strand. Superior tensile strength, combined with long-life, ruggedness and workability, makes *Crapo* Steel Strand first choice for guys, messenger and overhead ground wire.

The famous *Crapo* galvanizing process provides dependable protection for the steel, prolongs the expectant life of the strand.

- Low maintenance cost
- Laboratory tested and controlled quality
- Meets highest quality standards
- A size and grade for all practical needs
- Contact your *Crapo* Jobber Today!

INDIANA
STEEL & WIRE CO., INC.
Muncie, Indiana

THIEL TRANSFORMER HANGERS



MODEL	C-1	C-3
TRANSFORMER	75-100 KVA SINGLE PHASE	75-112½ KVA THREE PHASE
WEIGHT	46 LBS.	100 LBS.

HANGER KICKERS in sizes to T-TYPE HANGERS

THIEL HANGERS are made according to NEMA Specifications — HEAVY STEEL construction, HOT-DIP galvanized for dependable service and long life. Two styles complete with galvanized bolts and nuts.

IN STOCK FOR IMMEDIATE DELIVERY

THIEL EASY-DRIVE FASTENERS FOR ELECTRICIANS . . . REFRIGERATOR MEN PLUMBERS

Pat. No. 2632356

Easy-Drive STAPLES

NEW "GRIP-TYPE" SNAPS ON Easy-on STRAPS

T-TYPE HANGERS In Two Sizes for 3.33 KVA 1-Phase and 9.42 KVA 3-Phase Transformers

ANOTHER FIRST FOR THIEL

NEW HUMP THIEL PAT. PENDING WILL NOT BREAK OR PULL OUT

Easy-Drive NAIL-IT STRAPS

- Essential for Electrical Men
- Greatest Improvement in 30 Years

SOLD ONLY THRU LEADING ELECTRICAL WHOLESALERS

THIEL TOOL & ENGINEERING CO., INC.
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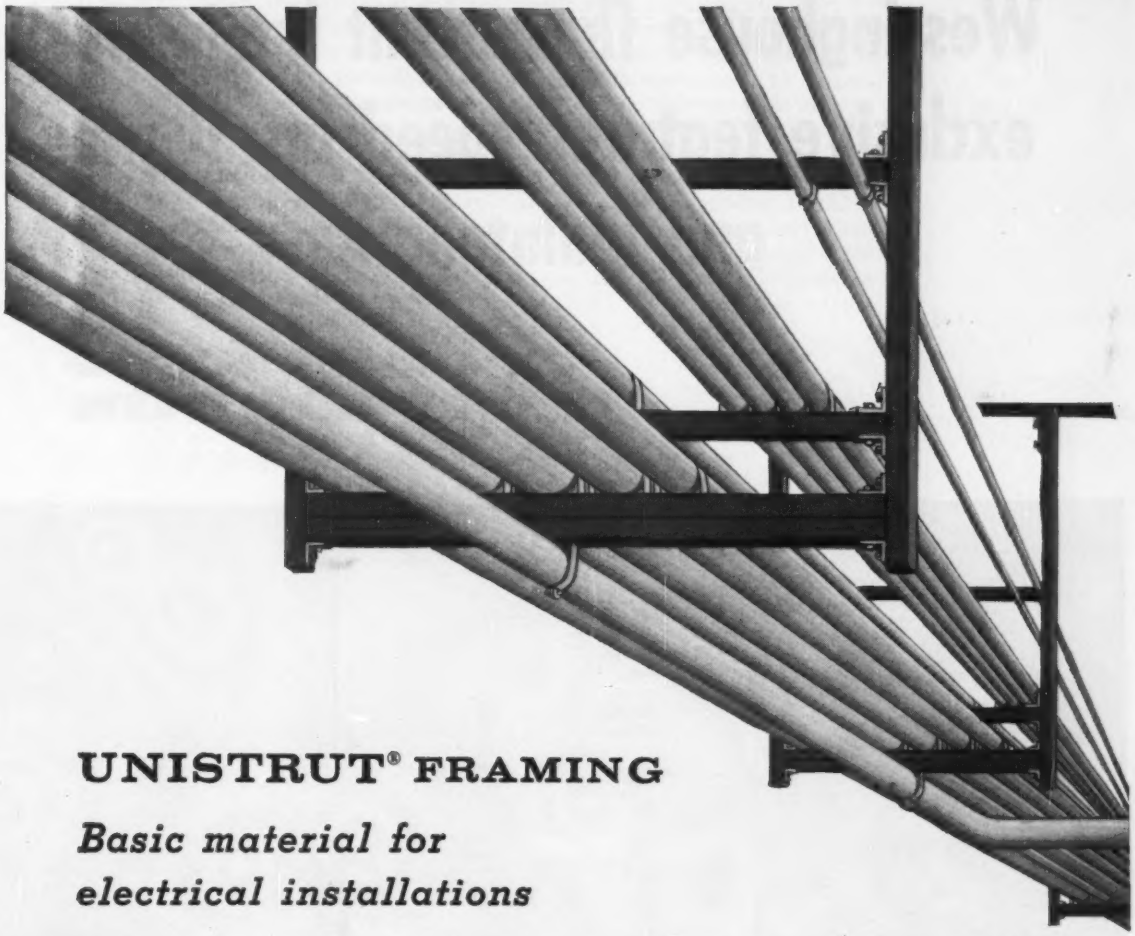


UNISTRUT® FRAMING

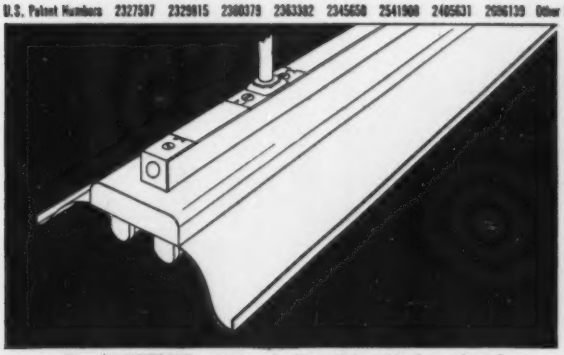
Basic material for electrical installations

World's Most Flexible All-Purpose Metal Framing.

For supporting conduit and cable in any installation, UNISTRUT offers the quickest, simplest assembly. It makes a clean, professional installation and is strong enough to support the heaviest run. With UNISTRUT Channel and Concrete Inserts even the trickiest installation is simplified. Capacities may be easily expanded to take care of future growth. All types of fittings, clamps and brackets are available. See your UNISTRUT distributor. Write for new Bulletin FF-5.

UNISTRUT PRODUCTS COMPANY, Dept. W-7
933 W. Washington Blvd., Chicago 7, Illinois

U.S. Patent Numbers 2327587 2329815 2380379 2383382 2345650 2541900 2405631 2696139 Other Patents Pending



The UNISTRUT system is listed by Underwriters' Laboratories, Inc. and may be used as a raceway.

Quickly installed, UNISTRUT Channel is rigid and strong, giving perfect, permanent alignment.

Westinghouse fluorescent luminaires' exclusive features speed installation and maintenance

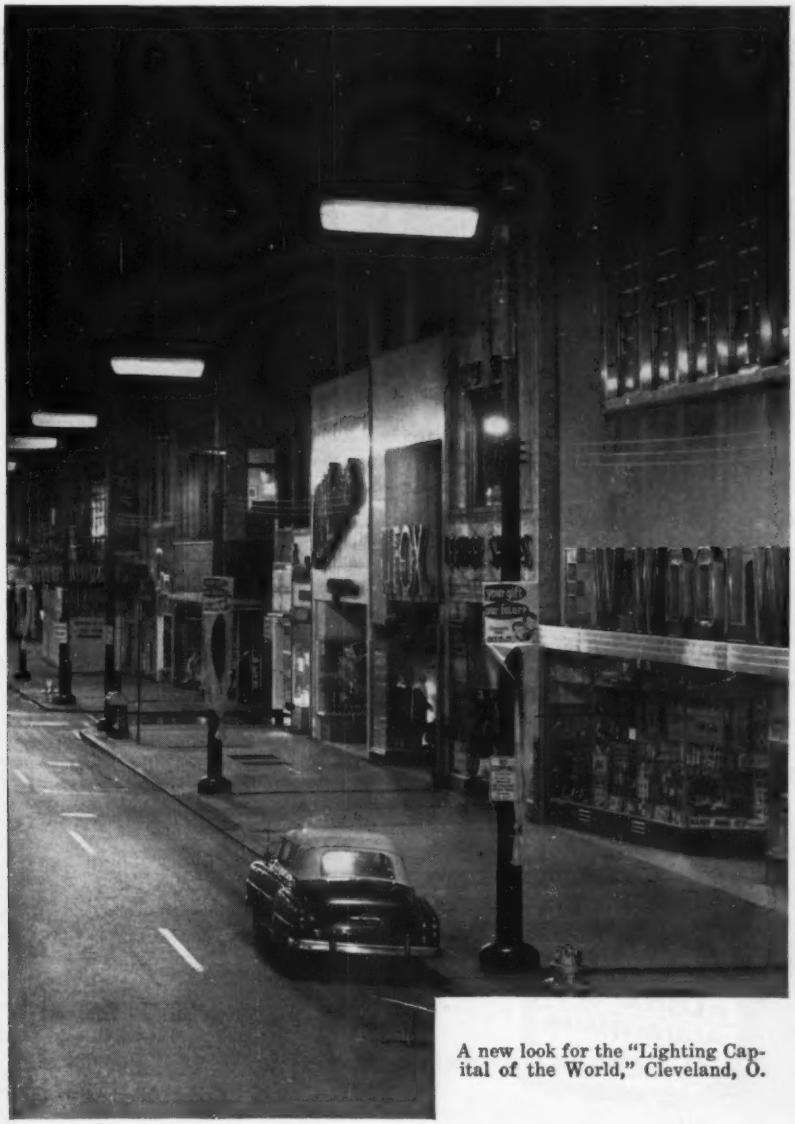
Look what's new in Cleveland! A great white way of fluorescent light by Westinghouse 4FSL-72 street lighting luminaires. The change from the old system to the new was made in record time because Westinghouse units are designed for quick installation and simple maintenance. The importance of these advantages can be measured in real savings—savings in labor cost during installation and for the maintenance life of your street lighting system.

If you are planning a fluorescent street lighting program, examine these important features, and you will agree that the Westinghouse 4FSL-72 fluorescent luminaire is built for a lifetime of efficient, economical operation.

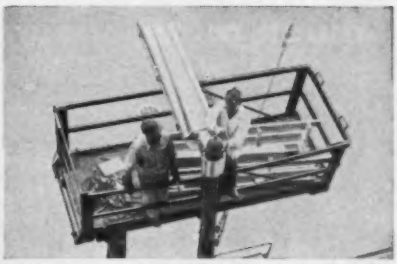
More information? See your nearby Westinghouse representative, or write Westinghouse Electric Corporation, Lighting Division, Edgewater Park, Cleveland, Ohio. J-04390

WATCH WESTINGHOUSE

where ***BIG*** *things are happening for* ***YOU***



A new look for the "Lighting Capital of the World," Cleveland, O.



Attaching luminaire to pole . . . is done by tightening four bolts on the heavy-duty mounting bracket. 4FSL-72 may be mounted horizontally or at a 15°-30° angle for wider light distribution.

Connecting wiring . . . three knurled nuts are loosened *without tools*, allowing reflector to hinge down for easy access to ballast and wiring. Wire is brought through watertight bushing; leads are then attached to terminal block.

Closing luminaire after installation . . . cover may be opened or closed from either side by releasing three pressure latches. Cover is clear acrylic plastic which will not discolor with age. Fiber glass housing *never* requires painting.

Alcoa® Aluminum meter shields perform three important functions that can save real money and embarrassment for electric utilities:

1. They protect pre-1946 meters against damage from lightning surges. These surges affect damping magnets . . . cause meters to run fast.

2. They protect meters from sunlight . . . keep them from 40° to 50° F cooler. This is especially important with delicate demand meters. Cooler running means longer life and greater accuracy.

3. They add physical protection and improve appearance.

Typically, it costs about $1.50 to inspect a meter . . . another $5.00 to remove, repair and reinstall.

When you install Alcoa Aluminum meter shields, you can extend repair cycles, protect the meter for longer periods and assure maintaining its accuracy.

For complete details and prices, contact your nearby Alcoa sales office. Aluminum Company of America, 2306-G Alcoa Building, Pittsburgh 19, Pa.

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ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

AIEE MEETING REPORT *continued*

ising means of detecting and locating defective fuel elements. Analog computer studies of the overall control system for Dresden will guide selection of instruments and controls and establishment of operating methods and practices.

Peabody predicted the plant will equal or better the 2% per min load-pickup rate of conventional steam plants. And Robbins stated that water corrosion, fuel element design, and testing of mechanical parts are problems for the Vallecitos, Calif., reactor experimental station.

Personnel needs for Duquesne Light Co's Shippingport Station were stressed by J. W. Simpson, Westinghouse Electric Corp, and M. Shaw, Atomic Energy Commission. Preliminary schedules indicate 130 employees will be required for the station rated 60 Mw initially. Of these, 81 will be needed for normal operation, compared with 66 for a unitized 100-Mw conventional steam plant. Training these people will cost 5-7 times as much as the training program for operators of an equivalent conventional steam plant. It is expected that the nuclear plant can be started from cold shutdown in 3.5 hr or within 1.75 hr following an overnight shutdown.

Fission alone constitutes the potential energy source which might damage the sodium-graphite reactor, said Dr Sidney Siegel, Atomics International, North American Aviation. This fission may never manifest itself with explosive violence because of these factors: Long neutron generation time, limited excess reactivity which can be loaded into the reactor, limit on time rate of release of reactivity, presence of a negative temperature coefficient of reactivity. Any energy release, he said, is small in terms of energy release per unit weight of fuel.

The most serious problem connected with a fast breeder reactor is processing highly enriched fuel, said W. R. McDaniel, Atomic Power Development Associates. Processing requires that fuel be recycled eight times, which introduces large losses and requires a large inventory of fuel. The fast breeder plant to be built for Detroit Edison is purely experimental with no thought of producing economic power. In the lifetime of the plant, said McDaniel, the hope is to demonstrate how to produce economic (6 mill) power.

(*Continued on page* 196)

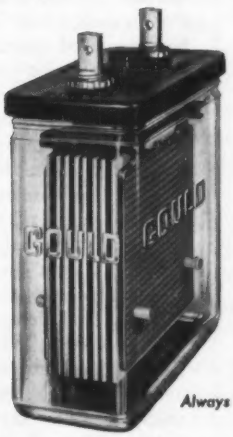
"Here's a Hot ONE!

Ever hear the one about the guy that didn't use

GOULD

Research-built

BATTERIES?"



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The Aristocrat of
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It's no joke when you pick the wrong battery. The lucky fellows are those that have standardized on GOULD. They not only have the satisfaction of knowing they've got advance-design, research-built batteries that will do more and last longer . . . they have the finest field engineering service in the industry to help keep these batteries in top condition throughout their greatly extended service life. Every Gould battery is proven in Gould's own pilot plant before it ever goes into production. That's why you can be sure of getting more power per dollar—with Gould!

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he's working for you

THIS FELLOW IS TRAINED IN YOUR BUSINESS. His main duty is to travel the country — and world — penetrating the plants, laboratories and management councils . . . reporting back to you every significant innovation in technology, selling tactics, management strategy. He functions as your all-seeing, all-hearing, all-reporting business communications system.

THE MAN WE MEAN IS A COMPOSITE of the editorial staff of this magazine. For, obviously, no one individual could ever accomplish such a vast business news job. It's the result of many qualified men of diversified and specialized talents.

AND, THERE'S ANOTHER SIDE TO THIS "COMPOSITE MAN," another complete news service which complements the editorial section of this magazine — the advertising pages. It's been said that in a business publication the editorial pages tell "how they do it" — "they" being all the industry's front line of innovators and improvers — and the advertising pages tell "with what." Each issue unfolds an industrial exposition before you — giving a ready panorama of up-to-date tools, materials, equipment.

SUCH A "MAN" IS ON YOUR PAYROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.

McGRAW-HILL PUBLICATIONS

House Heating Load Factor Evaluated

Indications are that electric heating is not so desirable a load as a combination of lighting, cooking, and water heating, said J. C. McAdam, British Columbia Electric Co. Compared to an 8-suite apartment with central water heating, a 20-suite building with load-limiting relays showed the value of load limiters in minimizing peak demand and thus increasing load factor. J. C. Beckett, Wesix Electric Heater Co, urged utilities to push both electric heating and cooling to balance seasonal load.

Clive Baugh, Pacific G&E Co, stated that an annual load factor of less than 5% for electric heating would bring in adequate revenue in his company's summer peak areas. In winter peak areas an annual load factor of 18-19% would be required. If electric heating shifts system peak from summer to winter, an annual load factor of 20-25% would be necessary to cover fuel costs and additional plant investment.

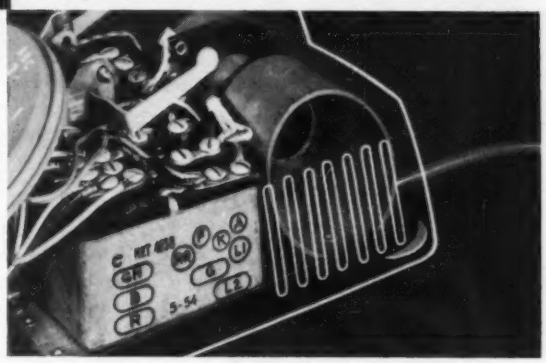
Heat Pump Has Low Upkeep

It is possible, concluded H. E. Burrier, Southern California Edison Co, to design and build an air-to-air heat pump of medium size to have a performance coefficient exceeding 3 for the heating cycle. Experience indicates that maintenance on an air-to-air unit is less in many cases than that required by conventional refrigeration-type air conditioning systems.

From papers on industrial applications and distribution systems, these comments were brought out: A. A. Kroneberg, Southern California Edison Co, said designers of industrial control systems and automatic machines should not assume continuous and constant voltage supply from the utility system. The utility engineer must advise customers that while voltage dips can be minimized they cannot be eliminated. Tendency in newer oil refineries of higher capacity and greater physical size is to use nominal 15-kv substation voltage, said George Dunbar, Westinghouse. Discussion disclosed that transient stability in industrial plants needs exploration.

Transistorized telephone summons you with a musical tone

Above: Experimental model resembles regular "500" set; the only visible departure is a louver in the base through which the musical tone is radiated.



Bell scientists have developed a new musical tone device which may some day replace the telephone bell, if it meets technical standards and customers' approvals.

Because the musical tone equipment uses transistors, the tones will be transmitted with the same amount of power required to transmit a telephone conversation — considerably less than is needed to make a telephone bell ring.

The experimental telephone sets resemble the current "500" sets; the only external difference is a louver at the side of the base through which the tone is radiated by a small loudspeaker mounted inside the telephone's base.

Tests have shown that the musical tone can be heard at great distances. It stands out above general room noise and can be distinguished from such sounds as ringing of doorbells, alarm clocks, and home fire alarms.

This new low-power signaling technique is expected to play an important part in the electronic switching system now under development at Bell Laboratories.

Above: Bell ringer has been displaced by a small loudspeaker in transistorized telephone. Left: L. A. Meacham heads the team of engineers that developed the musical tone ringer. Mr. Meacham holds a B.S. in Electrical Engineering from the University of Washington, Class of '29. He became affiliated with Bell Labs a year after his graduation. In 1939 Mr. Meacham won the "Outstanding Young Electrical Engineer" award of Eta Kappa Nu.

BELL TELEPHONE LABORATORIES

World center of communications research and development

World Power Hinges on Atom

(*Continued from page* 83)

neatly. He said: "We can expect that in a short time, large atomic power stations which also meet economic expectations will be in operation in various countries. The uranium deposits already known today leave no doubt that mankind will be able to satisfy its needs for energy for a practically unlimited time. . . ."

Foreign Literature

Some American delegates noted that, although foreign papers referred freely to American papers presented at Geneva last year and the present World Power Conference, reference was never made by American engineers to parallel experimental work being carried out on the Continental side of the Atlantic.

Some delegates said they were amazed to learn how far research work had advanced in Europe and the U.S.S.R. on problems with which they had been concerned. Charles W. Kinney, U. S. Army, Corps of Engineers, felt it is becoming increasingly common, and indeed "regrettable," for American engineers to concentrate solely on American technical literature.

Hydro and Thermal Power

It was made quite clear that the conference as a whole did not consider atomic power a universal solution to the world's power problems. Papers showed great attention is being given to better utilization of fuel in steam plants. Here the American engineers obviously were the leaders.

Super-critical plant experiments mentioned by Glenn B. Warren, General Electric Co vice-president, proved to be of great interest. Escher-Wyss of Switzerland also captured delegates' imaginations with descriptions of hot-air plants using coal firing and gas turbines. French engineers detailed free-piston compressor-gas turbine plants which could be combined with a steam plant, using waste gases of the turbine as combustion air in the boiler.

U. S. engineers were less prominent in the hydro sessions than in steam sessions. The hydro sessions revealed great increase of interest in pumped storage, and the design of bulb-type units—originating in France—which were particularly suitable for low-head, run-of-the-river developments, and which are to be used in the world's first tidal power project on the River Rance in Britain, Northern France.

Kerr spoke of the Hiwassee plant with the largest reversible pump-turbine of 8,000 hp in the world.

Regarding hydro-electric construction, the Russians described new methods of designing and producing large water turbines of conventional type. Extensive use of welding methods, resulting in greatly reduced weight, had been employed in the U. S. S. R., and special machine tools had been developed for working both sides of turbine blades at once, thus speeding up the operation.

Other Power Sources

Jesse Hobson, late of Stanford Research Institute, summarized results of the World Symposium on Applied Solar Energy held recently at Phoenix, Ariz. There was great interest in his description of a solar energy collector coupled to an engine which could transform 5% of the incident solar energy into mechanical power. And Soviet Delegate Baum showed slides of a 1,200-kw unit having mobile mirrors (to focus the sun's rays) totalling 20,000 sq meters of surface area.

American progress with the heat pump was described. The British are following closely behind in developing these devices. They talked about several industrial and domestic pumps.

There was considerable interest in the extended use of naturally occurring hot water and steam in geyser regions for power development. In New Zealand a 69-Mw plant is now under construction, and in Mexico, Kenya, and Japan natural steam is being considered as a power source.

Very little new development in regard to wind power was brought out in this session. But it was learned with interest that the French will go ahead with an industrial-sized plant (3,500 kw) at Abidjan on the Ivory Coast of Africa for utilizing the difference in temperature between the top and bottom layers of tropical oceans. In the Abidjan plant, warm water is taken to a special type of turbine where, in an exhausted chamber, it "boils" and the vapor passes through the turbine blades and is condensed by cold water brought from the bottom of the sea. The great problem has been related to the laying of large pipes on the ocean bed, but full-scale experiments have now shown this to be practicable.

The conference, which attracted about 2,000 delegates, was opened by the President of the Austrian Republic and was under the chairmanship of Sir Harold Hartley (Great Britain), who, at the end of the week's sessions, relinquished the chair for the next six years to Franz Holzinger of Austria.

It was recognized that the most pressing international need is for a uniform system of evaluating energy resources. It was suggested that the most useful function which the conference could perform between now and the next full-scale session (Australia, 1962) would be that of requesting the National Committees to agree on means of assessing energy resources.

Enlarged N.Y.C. Center Proposed for Engineers

Five of the nation's leading engineering societies may maintain headquarters in a new and expanded center in New York City, despite offers from Philadelphia, Pittsburgh, Chicago, and other bidders, according to a proposal by a special committee headed by Dr Barnett F. Dodge, chairman, chemical engineering department, Yale University. The committee consists of three representatives of each of the five societies.

The proposal, subject to approval by each society, calls for the remodeling and expansion of present headquarters of United Engineering Trustees, Inc.

First of the five organizations to vote approval to retain the Engineering Societies Center in New York is the American Society of Civil Engineers. Polls on the committee's recommendation are still to be taken by the governing bodies of the remaining four groups.

UET is composed of American Institute of Electrical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, and American Institute of Mining, Metallurgical, and Petroleum Engineers. The fifth society, American Institute of Chemical Engineers, is expected to join UET soon.

On the Road or in the Field

there's an INTERNATIONAL Truck exactly right for your job!

Variety of public utility jobs is matched only by the complete line of INTERNATIONAL Trucks, the world's largest selection. Whatever your operation, you get a powerful, long-lasting truck that is practically custom-built from the industry's widest choice of load-carrying and load-moving components. You get an INTERNATIONAL that is *all-truck* built to stay on your job longer. And you save the BIG money—the over-the-years operating and maintenance money.

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World's Most Complete Line of Public Utility Trucks

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All-Truck Built to save you the BIG money!

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Large New York Bank Has Position Open In Its Expanding Public Utilities Department

We are looking for a man between the ages of 30 and 35 who has a college degree and who has had experience in electric or gas utilities —preferably in finance, business research, rates and economics.

This is a permanent position through which the proper person will reach the officer category. Salary commensurate with qualifications and experience.

Those who are interested in this opportunity should write—

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Class. Adv. Div. P.O. Box 12, N.Y. 36, N.Y.

ELECTRICAL ENGINEERS STEAM POWER PLANTS

Excellent positions as project engineers for man experienced in the design and engineering of steam electric power plants and power systems.

These are permanent positions offering opportunity for advancement with an established, recognized firm serving the growing electrical utility industry. Many liberal employee benefits, including pension plan. Please submit resume of education and experience. State age and salary requirements. All replies will be treated confidentially.

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TRANSFORMER DESIGN ENGINEER

Unusual opportunity to advance quickly to executive in charge of new transformer plant

Nationally known electrical manufacturer with strong financial position expanding facilities to include both distribution and power transformers.

The man we want will be holding a responsible position with heavy experience in the design and manufacture of modern transformers.

Future opportunities unlimited. Salary open. Give Personal history and work experience. Information strictly confidential. We will contact no references without your permission.

P-2309, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

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Required by Operating Division of long established service and supervisory organization for large group of Electric Utilities located in eleven Latin American countries. Engineering assignments varied and interesting with responsibility. Some travel. Location New York. Usual employe benefits. Reply giving age, education, experience, personal particulars and salary expected.

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Electrical engineering degree in recognized university necessary.

Salaried position plus bonus, regular employee benefits included with better-than-average opportunity to move into positions of even broader scope and more responsibility. No traveling required.

Write stating qualifications in detail direct to:

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MADISON, WISCONSIN

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For rapidly growing electric utility in Northern New Jersey. Graduate Electrical Engineer desired. To assist Substation & Transmission Superintendent in directing construction and maintenance crews, evaluating tests of equipment and administering maintenance and replacement schedules. Excellent advancement opportunities. Reply giving training and experience.

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LOS ANGELES: 1125 W. 6th St. (17)

POSITION VACANT

Openings for eight topflight engineers. Write Hubbard and Company, world's largest manufacturer of pole line hardware. See Advertisement on page 170.

PERIODICALS

A.I.E.E. Transactions wanted to buy for cash and other technical and scientific periodicals. E. W. Ashby 27 E. 21; N. Y. C. (10)

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-4731) will be received at Denver, Colorado, until August 23, 1956, for furnishing one 1,500-kva, 46 grd Y- to 2.4 delta-kv, 3-phase, class OA, outdoor, power transformer for Wanship Power Plant; and two 2,000/2,300-kva, 46 grd Y- to 2.4 delta-kv, 3-phase, class OA/FA, outdoor, power transformers for Gateway Power Plant for Weber Basin Project, Utah. Delivery is desired within 300 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

FOR SALE
SUBJECT TO PRIOR SALE
200 Westinghouse Type CO, Inverse Time Relays, Rated 0.5/2.5 Amperes, 60 Cycle, with Universal Operation Indicator. In Modern Flexitest Cases Which Can Be Mounted Either Flush or Projection. All in First Class Condition. Can Be Used Interchangeably. Styles Nos. 1271197, 1275192, 1545824 and 1545812. If Interested Contact N. C. Stirewalt, V. P., Central Illinois Public Service Company, Springfield, Illinois.

TRANSFORMERS

Qu. KVA Mfgr Type Form Voltage
3 1667 G.E. OAP VD 66,000-19,100/33,000Y

Priced For Quick Sale

MARYLAND PIPE & METALS COMPANY, INC.
304 West Church St. Hagerstown, Maryland

FOR SALE
1400 steel suspension clamps for #2 and #4ACSR over armor Rod or 1/0 ACSR Armor tape. Price $1.00 each.

WEST CENTRAL ELECTRIC COOP., INC.
Murdo, South Dakota

MOTORS · GENERATORS
TRANSFORMERS
NEW · REBUILT
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT CO.
PHONE STATION COLLECT GL 6781
ROCHESTER 1, NEW YORK

WANTED — TRANSFORMERS

3 phase 6600 or 7200 volts
75—100 KVA

ATLANTIC ELECTRIC METER CO.
214 East 41st Street New York 17, N. Y.
Wire or telephone collect Murrayhill 2-4630

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SEARCHLIGHT SECTION

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$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

The advertising rate is $14.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches—to a page.

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Send NEW ADVERTISING to Classified Advertising, P. O. Box 12, N. Y. 36, N. Y.

TRANSFORMERS

SPECIAL PURCHASE

five carloads
13800 volt transformers
sizes 25 KVA to 250 KVA
new and slightly used

What can you use?
Write for list and prices

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.
5316 Hetzel St.
Cincinnati 27, Ohio

40 Years' Dependable Service

LARGE POWER EQUIPMENT

Prompt Stock Shipment
RENUBILT MOTORS - GENERATORS
TRANSFORMERS - CIRCUIT BREAKERS
DO YOU GET OUR STOCK LIST?

BELYEA COMPANY INC.
51 Howell St. Jersey City, N. J.

FOR SALE

USED TRANSFORMERS

In First Class Condition

3—15 K.V.A. Westinghouse OISC Transformers, 2200 Primary, 110-220 Secondary.

2—37½ K.V.A. Westinghouse OISC Transformers, 2200 Primary, 220-110 Secondary, Single Phase, Type SK.

Apply

J. M. WAITE,
Mechanical Superintendent
HAMILTON SPECTATOR
HAMILTON, ONT.

SUBSTATION EQUIPMENT

TRANSFORMERS

QU.	KVA	MFGR.	VOLTAGE
3	200	Pitts.	66,000—2300
3	1500	Wag.	44,000—6900/11950
3	1250	A.C.	44,000/11500—460
3	75	West.	44,000—7200/12470Y
3	5000	G.E.	38100/66000—6600
4	3333	G.E.	38100/66000Y—33000
4	3125	Mol.	39900/66000Y—26600/46000Y
3	3333	G.E.	13800/11000—2400/7200
1	3000	A.C.	34500—2400/7200/12470Y, 3 Ph.
2	3000	Stand.	33000—4160, 3 Ph.
3	1500	A.C.	34,500—2300
3	667	A.C.	33,000—2400/4160Y
3	500	West.	34,400—13,800
4	333	Kuhl.	33,000—7200/12470Y
3	200	A.C.	34500—2400/7200/12470Y
3	75	Wag.	33,000—240/480
1	3000	A.C.	23,380—2500/4330Y, 3 Ph.
3	1000	G.E.	23,310—2500/7500/12990Y
3	100	G.E.	22,000—7200/12470Y
3	50	G.E.	22,000—2300
2	3000	G.E.	13,800—600, 3 Ph. Unit Sub.
3	1200	West.	13,800—600, 3 Ph. Unit Sub.
1	1000	West.	13200—2300, 3 Ph. Unit Sub.
1	1000	A.C.	13800—480, 3 Ph.
3	1000	G.E.	13800—240/480
1	600	Stand.	13200—2300, 3 Ph.
1	450	Penna.	13200—2400, 3 Ph. ASKAREL
3	200	G.E.	13200—2400
1	2500	A.C.	11,000—2400/4160Y, 3 Ph.
1	1500	G.E.	11,500—4000, 3 Ph.
3	125	A.C.	6900—2300
3	333	G.E.	2400/4160Y—460
3	200	West.	2400—240/480
3	150	West.	2400—230/115
1	100	G.E.	2300—575, 3 Ph.
6	50	West.	2400—114/228, Dry Type

OIL CIRCUIT BREAKERS

6—600 A., 15 KV, G.E., FK-155, 350 MVA
1—600 A., 15 KV, G.E., FK-255, 100 MVA
2—600 A., 15 KV, G.E., FLO-15, 50 MVA
2—400 A., 37 KV, G.E., FHKO-136, 350 MVA

ALSO: FREQ. CHGRS., M-G SETS, SYN. CONDENSERS, FEEDER REGULATORS, ETC.

BREW, WOLTMAN & CO., INC.
52 Church St., New York 7, N. Y.

ELECTRICAL WIRE AND CABLE

—YOUR BEST SOURCE—

- for every industrial and power application
- Odd lengths—long and short—reasonably priced

One of the Largest Stocks in the Midwest

Let us quote on requirements—send your inquiries
We'll also buy your Surplus

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FOR YOUR TEMPORARY NEEDS TRY OUR SURPLUS DIVISION

UNIVERSAL WIRE and CABLE Co.
2929 N. Paulina St. Chicago 13, Ill.
EAstgate 7-4777 Code: UNIWIRE

New and Used Equipment Available for
POWER PLANTS, SUBSTATIONS, TRANSMISSION LINES AND CONSTRUCTION
Send for new list to
EBASCO SERVICES INCORPORATED
APPARATUS EXCHANGE **Two Rector St., New York 6, N. Y.**

MEETINGS CALENDAR

JULY

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS—Annual Convention, Sheraton Palace Hotel, San Francisco, Calif., July 24-27.

COLUMBIA UNIVERSITY INDUSTRIAL & MANAGEMENT ENGINEERING DEPARTMENT—Fifth Annual Utility Management Workshop, Arden House, Harriman, New York, July 29-Aug. 10.

AUGUST

ALASKA RURAL ELECTRIC COOPERATIVE ASSOCIATION—Annual Meeting, Palmer, Alaska, Aug. 9-11.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Heat Transfer Division, First National Conference, Pennsylvania State University, Aug. 11-15.

WESTERN ELECTRIC SHOW AND CONVENTION—Pan Pacific Auditorium and Ambassador Hotel, Los Angeles, California, Aug. 21-24.

SEPTEMBER

NORTHWEST PUBLIC POWER ASSOCIATION, INC—Meter School, Oregon State College, Corvallis, Oregon, September 10-14; Accounting Section, Cascadian Hotel, Wenatchee, Washington, September 11-14.

EDISON ELECTRIC INSTITUTE—Organization Meeting, sponsored jointly with AGA, Edgewater Beach Hotel, Chicago, Ill., Sept. 13-14; Industrial Relations Round Table Conference, Drake Hotel, Chicago, Ill., Sept. 17-19; Meter & Service Committee, Purdue University, Lafayette, Ind., Sept. 24-26.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—38th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 14-15.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—3rd Annual Electrical Conference of the Petroleum Industry, Kansas City, Mo., Sept. 17-19.

ILLUMINATING ENGINEERING SOCIETY—National Technical Conference, Hotel Statler, Boston, Mass., Sept. 17-21.

INSTRUMENT SOCIETY OF AMERICA—11th Annual Instrument-Automation Conference and Exhibit, New York Coliseum, Sept. 17-21.

ATOMIC INDUSTRIAL FORUM, INC—3rd Annual Forum Conference and 2nd Annual Trade Fair, Morrison Hotel and Navy Pier, Chicago, Ill., Sept. 24-28.

PENNSYLVANIA ELECTRIC ASSOCIATION—Annual Meeting, Hotel Wm. Penn, Pittsburgh, Pa., Sept. 25-26.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Steering Committee, Blackstone Hotel, Chicago, Ill., September 26; Workshop Conference, Blackstone Hotel, Chicago, Illinois, September 26-28.

OCTOBER

EDISON ELECTRIC INSTITUTE—Prime Movers Committee, Radisson Hotel, Minneapolis, Minn., Oct. 1-3; Area Development Committee Meeting, Oct. 3, and Area Development Committee Workshop, Radisson Hotel, Minneapolis, Minn., Oct. 4-5; Electrical Equipment Committee, Hotel Statler, Cleveland, Ohio, Oct. 15-16; Transmission and Distribution Committee, Hotel Statler, Buffalo, N. Y., Oct. 18-19.

ILLINOIS INSTITUTE OF TECHNOLOGY—12th Annual National Electronics Conference, sponsored jointly by AIEE, Institute of Radio Engineers, University of Illinois, and Northwestern University, Hotel Sherman, Chicago, Ill., Oct. 1-3.

NATIONAL ELECTRONICS CONFERENCE—12th Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill., Oct. 1-3.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Fall General Meeting, Morrison Hotel, Chicago, Ill., Oct. 1-5.

CANADIAN ELECTRICAL MANUFACTURERS' ASSOCIATION—12th Annual Meeting, Sheraton Brock Hotel, Niagara Falls, Ontario, Canada, Oct. 3-5.

STANDARDS ENGINEERS SOCIETY—Fifth Annual Meeting, Hotel Willard, Washington, D. C., Oct. 3-5.

INDIANA ELECTRICAL ASSOCIATION—Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 3-5.

• **SOUTHEASTERN ELECTRICAL EXCHANGE**—Sales Conference, Tides Hotel & Bath Club, St. Petersburg, Fla., Oct. 3-5; Accounting Meeting, Hotel Seville, Miami, Fla., Oct. 10-11.

INTERNATIONAL ASSOCIATION OF ELECTRIC LEAGUES—Sheraton-Cadillac Hotel, Detroit, Mich., Oct. 3-6.

• **PENNSYLVANIA ELECTRIC ASSOCIATION**—Electric Equipment Committee, Arlington Hotel, Binghamton, N. Y., Oct. 4-5.

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Annual Fall Convention, Broadmoor Hotel, Colorado Springs, Colo., Oct. 7-10.

INTERSTATE POWER CLUB—Hotel Martinique, New York, New York, Oct. 8.

ILLINOIS INSTITUTE OF TECHNOLOGY—Conference on Computer Applications, Chicago, Ill., Oct. 9-10.

INTER-INDUSTRY FARM ELECTRIC UTILIZATION COUNCIL—National Power Use Workshop, Milwaukee Auditorium, Milwaukee, Wis., Oct. 15-16.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Electrification of Machine Tools Conference, Sheraton-Gibson Hotel, Cincinnati, Ohio, Oct. 22-24.

UNIVERSITY OF TEXAS—Ninth Power Distribution Conference, University Batts Auditorium, Austin, Tex., Oct. 22-24.

AMERICAN STANDARDS ASSOCIATION—38th Annual Meeting and 7th National Conference on Standards, Hotel Roosevelt, New York, Oct. 22-24.

NATIONAL SAFETY COUNCIL—44th National Safety Congress & Exposition, Chicago, Illinois, Oct. 22-26.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS—South Central Region Meeting, M & M Building, Houston, Texas, October 23-26.

NORTHWEST PUBLIC POWER ASSOCIATION—Power Use Section, Franklin PUD Auditorium, Pasco, Wash., Oct. 25-26.

MONTANA STATE RURAL ELECTRIC COOPERATIVE ASSOCIATION—Annual Meeting, Lewistown, Mont., Oct. 29-31.

NOVEMBER

NATIONAL RURAL ELECTRIFICATION COOPERATIVE—Region Nine Annual Meeting, Davenport Hotel, Spokane, Washington, Nov. 12-13.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION—Annual Meeting, Traymore Hotel, Atlantic City, New Jersey, Nov. 12-16.

EDISON ELECTRIC INSTITUTE—Industrial Relations Committee, EEI Headquarters, New York, N. Y., Nov. 15; Accident Prevention Committee, Statler Hotel, Hartford, Connecticut, November 26-28.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—22nd National Exposition of Power and Mechanical Engineering, Coliseum, New York, N. Y., Nov. 25-30.

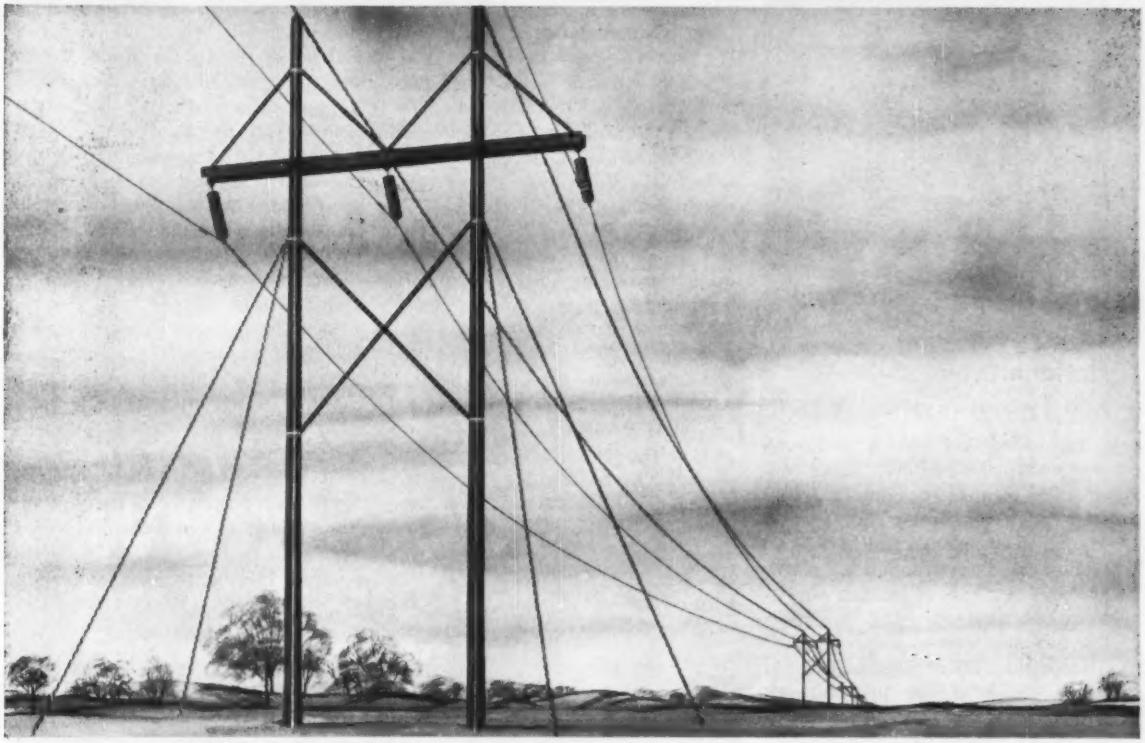
DECEMBER

INSTITUTE OF RADIO ENGINEERS—2nd Instrumentation Conference, Biltmore Hotel, Atlanta, Ga., Dec. 5-7.

EDISON ELECTRIC INSTITUTE-AMERICAN GAS ASSOCIATION—1957 Conference Planning Committee, EEI-AGA Headquarters, New York, N. Y., Dec. 6-7.

• Additions this week.

CF&I GALVANIZED STEEL STRAND



made in the east and the west for prompt delivery

East or West, there's a single, convenient source of top-quality galvanized strand for ground, messenger and guy wire. That's because dependable time-proved CF&I Galvanized Strand* is produced at both Buffalo, N. Y., and Pueblo, Colorado.

This combination of plant sites enables CF&I to quickly and efficiently fill your strand requirements.

What's more, you're always sure of the quality of CF&I Galvanized Strand. Every phase of its production is handled by the makers of world-renowned Wickwire Wire Rope and Wire Rope Slings...every phase of its production is under CF&I's rigid quality control system.

Next time you need strand—whether it's to ASTM Specification A-122, A-363 or your specification—it'll pay you to contact the closest CF&I sales office listed below.

*three- and seven-wire constructions

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GALVANIZED STEEL STRAND
THE COLORADO FUEL AND IRON CORPORATION

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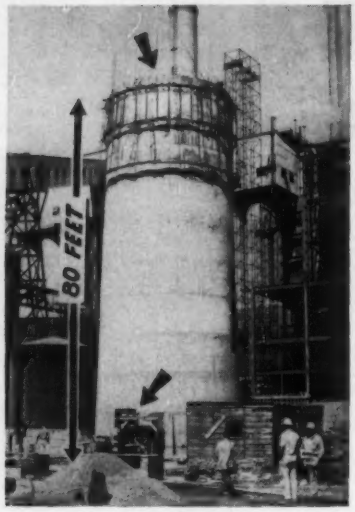


Platform Drops 80 Feet, Kills Two at Mystic Plant

Eighty-foot collapse of a 2.5-ton wooden circular platform during construction of a 335-ft reinforced concrete stack for Boston Edison Co's Mystic steam plant resulted in two fatalities and seven injuries. Arrow at top of photo shows location of platform before accident, and bottom arrow indicates level to which it fell.

Inspection after the accident, in which the 80-ft-high platform fell down the inside of the chimney to the bottom, showed that the steel cables carrying the scaffolding were not in place. The reinforcing rods inside the forms into which the concrete had been poured still projected upward.

The stack is to serve Mystic station's new 140,000-kw turbine generator unit which will have a capability nearly equal to the total 177,000 kw of the three units now in operation.

PG&E Tunnel Collapses

A cave-in during construction of a 24-ft diam. diversion tunnel for Pacific Gas & Electric Co's 34.9-million Poe hydroelectric project on the Feather River recently killed two workers. Seven timber structures in the 6½-mi long tunnel collapsed, causing a section of the roof to cave in. Possible cause of the weakened timbers is attributed to vibration from rock removal cars. A second accident 10 days later was caused by the fall of a 15-ton slab of serpentine rock which had projected from upper quadrant of the tunnel face. Two workers laying track were killed.

Boiler Explosion On Start-up

. . . forces major overhaul by Southwestern PS

An explosion during routine start-up last month severely damaged a 100,000-lb/hr boiler at Southwestern Public Service Co's Carlsbad, (N.M.) plant. Repairs are scheduled for completion next week. Cause of the explosion has been traced to an open burner valve which made start-up precautions ineffective.

These events preceded the explosion during a routine inspection of the 4-year-old boiler: After an inspection, the fireman started fans to purge the first boiler. He visually inspected plug cocks which valve gas into the burners. After the required interval, he lit the gas pilots through an electric ignitor and at this point the explosion occurred.

The boiler setting and front were demolished. Fan breechings were damaged severely. The fireman, in a protected position, sustained only a minor burn on one leg.

Subsequently one burner valve and a plug cock were found in an open position. An examination showed that the weight of the handle would slowly open the cock. Investigators concluded that the handle opened the plug cock and let gas in the furnace when the operator reset the fan interlock at the boiler panel.

Boilers at the plant are equipped with meters which sound an alarm in the event of a combustible mixture in the furnace. But it takes about 2 min for the meters to register the condition. Charts show that this meter sounded an alarm at the same instant the fireman lit the boiler.

Steps are being taken to prevent recurrences elsewhere. Plug valves on all boilers are being checked to eliminate conditions which could open a valve accidentally. Methods of interlocking burner valve with ignitors and/or the main gas valve to give an alarm when burner valves are open are being studied so that protection of this type can be installed on remotely operated boilers. Purging periods on all boilers will be a minimum of 5 min and on many boilers will be longer.

Changes in Capacity Reported to FPC

PLANT ADDITIONS DURING MAY

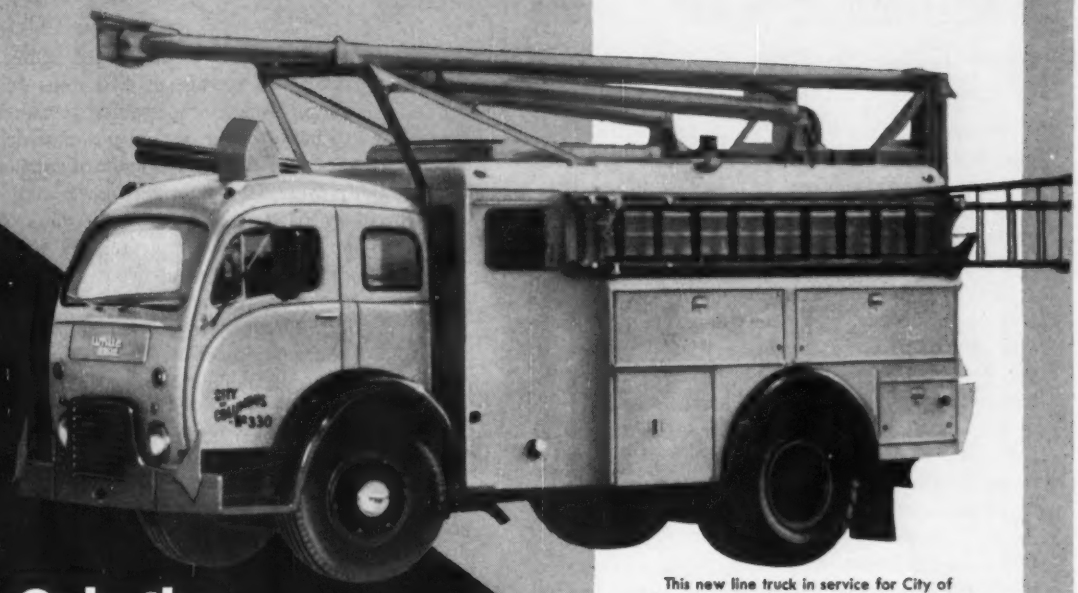
State	Utility	Plant	Fuel	Capacity
Ala.	Alabama Power Co	Gorgas No. 3	S	156,250
Calif.	Los Angeles Dept of Water & Power	Valley	S	156,250
Ind.	Public Service Co of Indiana, Inc	Wabash River	S	125,000
Iowa	Iowa Electric Light & Power Co	Guthrie Center	IC	1,000
Iowa	Maquoketa Municipal Electric Dept	Maquoketa	IC	1,754
Iowa	Vinton Electric Plant	Vinton	IC	1,360
N. C.	Tennessee Valley Authority	Hiwassee Dam	H	59,500
Okla.	Oklahoma Gas & Electric Co	River Bank	S	150,000
Pa.	Girard Borough Municipal Light Dept	Girard	IC	1,135
Tex.	Hearne Municipal Electric Light Dept	Hearne	IC	1,360
Wis.	Menasha Electric Water Utilities	Menasha	S	7,500

RETIREMENTS

Mich.	Consumers Power Co	Plainwell 2	H	150
Mo.	Missouri Edison Co	O'Fallon	IC	208
N. D.	Montana-Dakota Utilities Co	New England	IC	620
Ohio	Galion Municipal Light & Power Dept	Galion	S	6,500
Pa.	Girard Borough Municipal Light Dept	Girard	IC	200
S. C.	Duke Power Co	Boyds Mill	H	240
Utah	Utah Power & Light Co	Moab	IC	416

U. S.	Hydro	Steam	IC	Total
Added	59,500	595,000	6,609	661,109
Retired	390	6,500	1,444	8,334
Adjustments Plus	.....	3,000	.....	3,000
Adjustments Minus	.....	.....	.....	.....
Net Change	59,110	591,500	5,165	655,775

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of June 1—Hydro, 25,461,871 kw; Steam, 89,602,573 kw; IC, 2,368,627 kw; Total, 117,433,071 kw.



This new line truck in service for City of Columbus Division of Electricity is Model 3020 White with hydraulic pole frame for pole setting.

Only the WHITE 3000 Has All These Cab-Forward Design Advantages!

They Boost the Efficiency of Your Transportation Service First Day on the Job

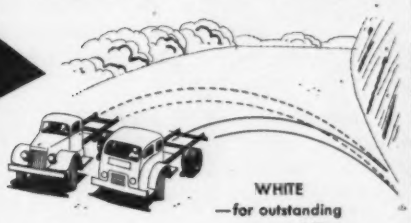
WHITE 3000 is not only the most modern looking truck in utility transportation service—it is the most efficient! Its every functional feature is designed for more work . . . lower cost . . . and time savings.

Find out how many ways the White 3000 with the power-lift cab fits into your business needs.

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

FIRST—IN THE FIELD
White 3000
PROVED IN BILLIONS OF LOW-COST MILES

For More Than 55 Years The Greatest Name In Trucks



WHITE
—for outstanding maneuverability

WHITE cuts overall length—saves work time

WHITE
for roomiest cab

WHITE
improves visibility and safety

READERS FORUM

Chief Joseph Is Army Engineers' Dam

To the Editor:

In your June 18 issue a statement was made on page 6 that "Bonneville Power Administration dedicates Chief Joseph Dam on the Columbia River. The project is planned for eventual rated capacity of 1,743,000 kw."

It is unfortunate that someone contributed a very erroneous statement. Bonneville Power Administration is the federal government agency which sells and distributes power from the federal projects in the Pacific Northwest. Bonneville Power Administration has not constructed and does not operate any of the federal power projects in this region.

Chief Joseph Dam, on the Columbia River in north central Washington, is one of the projects under jurisdiction of the Corps of Engineers, U. S. Army. The dedication was held June 12, with the Corps of Engineers cooperating with a committee made up of representatives of the North Central Washington Chambers of Commerce. Harold E. Stassen, special assistant to the President of the United States, was the dedication speaker.

Chief Joseph Dam is planned for eventual rated capacity of 1,728,000 kw.

Gilbert R. Bean,
Chief, Technical Liaison Branch
Corps of Engineers, U. S. Army
Office of the District Engineer
Seattle District,
Seattle, Wash.

• Electrical World regrets that it missed another opportunity to give proper credit to the Corps of Engineers whose achievements in the hydro-electrical field are generally recognized.

TVA Rates Depend on Class of Power

To the Editor:

According to your report on page 43 of your May 7 issue, Prof A. J. G. Priest of the University of Virginia very seriously garbled the facts with respect to TVA average rates for power delivered to federal agencies and to industry. As reported, "He pointed out that large industrial companies are buying power at between 3.36 and 4.18 mills per kwhr while federal agencies are paying TVA an average of 4.73 mills." On this basis, according to your report, he "attacked" TVA "subsidies to industrial companies."

Professor Priest should have been aware that different classes of power were involved, particularly as this was made clear in the table on page A41 of the TVA's 1955 fiscal year annual report which evidently was the source of his quoted figures.

To illustrate, the average of 4.73 mills per kwhr paid by federal agencies represented revenues from sale of 11.6 billion kwhr of firm power under long-term contracts and 10.1 billion kwhr of supplemental or special power. This latter was power supplied on a temporary basis, mostly to the Atomic Energy Commission, while generating facilities were being built to supply the long-term needs of this agency. As this class of power had to come from marginal sources on the TVA's system or neighboring systems, it was of course more costly, averaging 5.90 mills per kwhr. (As the table shows, a small amount of supplemental power was delivered to industry at 14.16 mills per kwhr). On the other hand, the cost to the AEC and other federal agencies under long term contracts for firm power averages only 3.71 mills per kwhr.

In comparison, sales to industry under long-term contracts including both firm and interruptible power were made at an average rate of 3.85 mills per kwhr. In short, when a reasonable comparison is made on the basis of long-term contracts, it is clear that—contrary to Professor Priest's reported conclusion—federal agencies paid a lower rate for a higher quality of power than did the average TVA industrial customer.

We would appreciate having these facts drawn to the attention of your readers.

Paul L. Evans
Director of Information
Tennessee Valley Authority
Knoxville, Tennessee

480Y/277-V Transformers not Standard

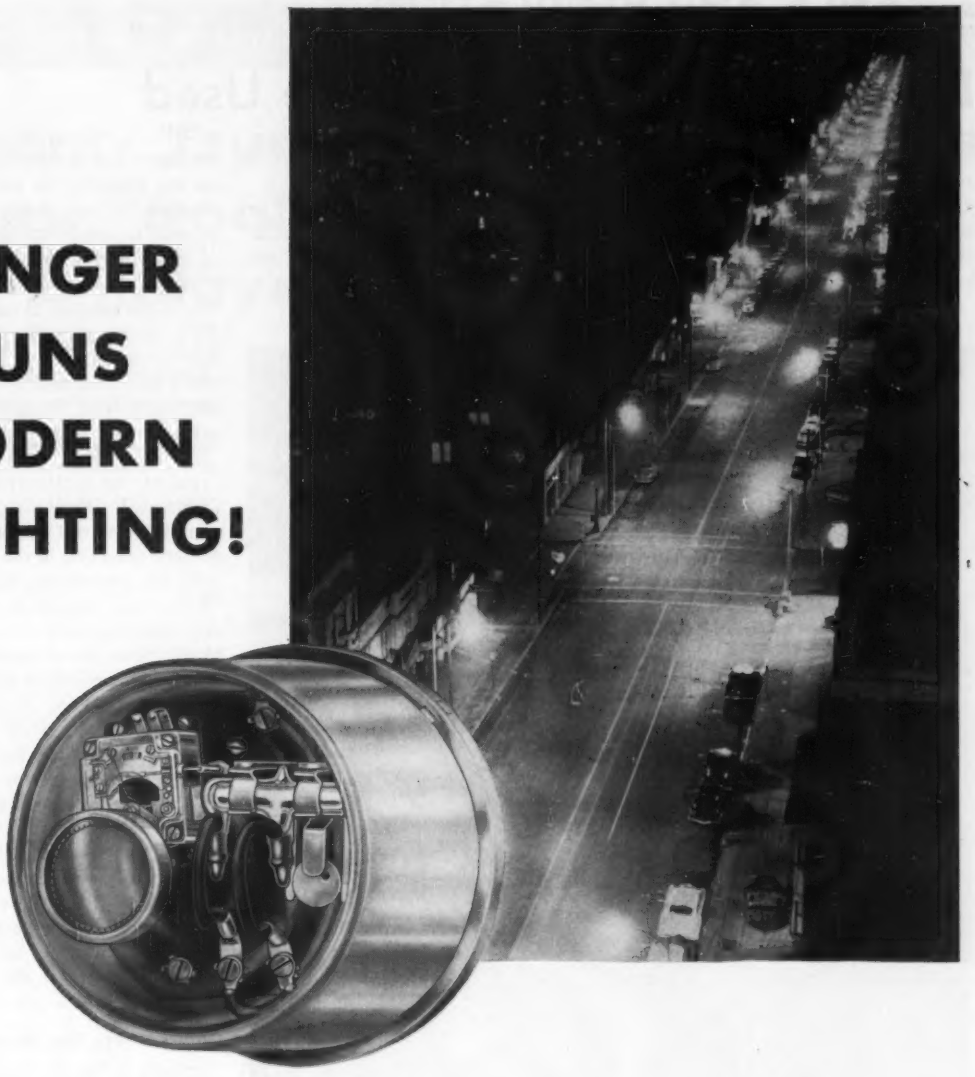
To the Editor:

On page 91 of the May 14 issue, you referred to 480Y/277-v transformers as "standard." I regret to say that most transformers for this secondary voltage, including network transformers, load center transformers, and the substation sizes of distribution transformers have not been standardized as yet.

This is true even though such units are in substantial use and demand by electric utilities as well as industrial purchasers. Standardization of these ratings in appropriate sizes is long overdue. Speaking for the ASA C 57 Subcommittee on Power and Distribution Transformers, we continue to hope for authorization from EEI to proceed with transformer standardization in this important area.

H. M. Jalonack,
Chairman
ASA C 57 Subcommittee on
Power and Distribution Transformers

DANGER SHUNS MODERN LIGHTING!



Modern lighting is safer, surer, with trouble-free WESTON control

To make modern lighting installations fool-proof . . . to be sure beyond any question that lights are *on* whenever needed, and *off* only when *not* needed . . . more and more systems are installing the simplified WESTON plug-in Illumination Control. Employing only a few time tested components (no vacuum tubes, resistors or capacitors used) requiring no stand-by power, and with operating points unaffected by temperature, voltage, humidity or power failure, this simplified control provides unfailing operation over far longer periods. To get all the facts, call your local Weston representative, or write WESTON Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, N. J. A subsidiary of Daystrom, Incorporated.

WESTON

plug-in

ILLUMINATION CONTROL

Deferred Tax Savings Can Be Used

The State Corporation Commission of Kansas has acceded to the Kansas City Power & Light Co request to use normalized taxes arising from the liberalized provisions of Section 167 of the Internal Revenue Code. The order was dated May 16.

The order noted in part that "To the extent that accelerated depreciation for income tax purposes will enable applicant to have funds available for the financing, in part, of its construction requirements, applicant will be able to curtail or defer the issue of a portion of the securities which would otherwise be required. In other words, the election to take accelerated depreciation under the Code can provide applicant during its periods of heavy expansion with a source of what may be termed 'interest-free funds' ".

Taxes Deferred Not Reduced

As to the controversy of whether accelerated depreciation produces merely a deferral of taxes or a permanent reduction in the level of taxation, the commission had this to say "That when applied to specific property additions, such as a single unit or to additions for a specific year, accelerated depreciation under the Code has the effect of reducing income taxes during the early life of such property, but at the same time there is being created a future tax liability. Assuming no change in tax rates or in the provisions of the Code and limiting our consideration to such single unit or specific year's additions, the total tax liability over the life of such property may be said to be at least as great under accelerated depreciation as under the straight line method."

Going Utility Has Many Units

However, when dealing with a property that has continuing growth with many units of property being added, the commission noted significantly that "the property accounts for a going utility do not consist wholly of a single unit or the additions of a single year, but most often they consist of a great many units constructed or acquired over a period of years, some of which ordinarily will have been replacements of prior retired units.

"When such going utilities reach a point of stabilization and there is little or no growth, the annual depreciable property additions to which accelerated depreciation under the Code would be applicable, normally can be expected to at least equal the retirements. If there is growth, such annual additions, although fluctuating

(*Continued on page* 210)

WWP Pays for Citizens Utilities' Facilities

Washington Water Power Co's Chief Counsel Alan Paine hands a $950,000 check to Joseph E. Griffin (seated) treasurer of the Citizens Utilities Co, following purchase of the Citizens' facilities in northeastern Washington State by WWP.

These facilities serve some 2,500 customers who live in the small Washington towns of Deer Park, Valley, Loon Lake, and Clayton, and in the rural areas of southeastern Stevens County, northern Spokane County and part of Pen Oreille County.

Kinsey M. Robinson, WWP president, announced that immediate rate reductions, amounting to about 25%, would be given the new WWP customers.

Guaranty Trust Company Develops New "Pooled" Funds Plan for Employee-Benefit Trusts

Companies with pension, profit-sharing, or other employee-benefit trust funds can now select pooled trust funds with investment program to suit their needs.

A new kind of employee-benefit trust fund arrangement, established recently by Guaranty, makes it possible for companies desiring to invest in pooled funds to achieve greater diversification of investments than ever before.

Unlike many other pooled fund arrangements, the Guaranty plan does not "freeze" all participating trusts into a single diversification program. Rather, it is made up of two "commingled" funds: the first invests only in common or capital stocks, the second in investments other than common or capital stocks.

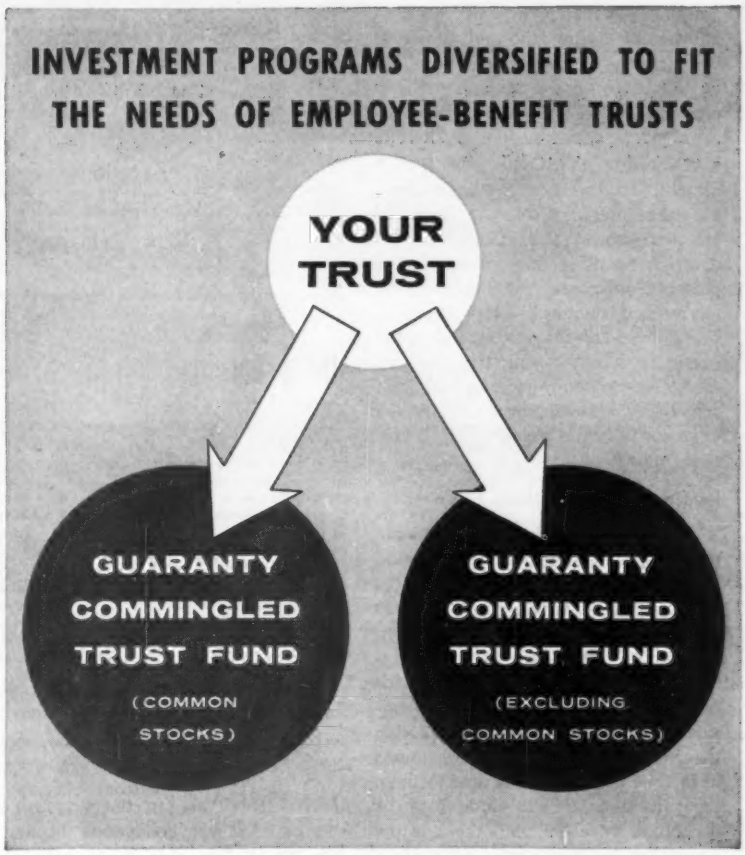
Here's how it works:

- The investment policy for each participating trust is determined by Guaranty after consultation with officers or directors of the corporation —or the company may itself fix the investment policy. Within the scope of the policy established, the proportion of the participating fund to be invested through the medium of each of the Commingled Funds is then determined.
- The proportion of the fund invested through each of the two commingled trusts is subject to revision to meet changing economic conditions.
- There is no maximum dollar limit on the size of the individual trust that may participate.
- A trust may invest through either or both of the funds.
- Participation is limited to employee-benefit trusts of which Guaranty is sole trustee, which qualify under the Internal Revenue Code and which specifically authorize participation.

Guaranty Trust Company is trustee of both Commingled Funds and is responsible for their operation and for the selection of investments held in them.

Each of the Commingled Funds will hold many issues of securities, some of which, because of their size, could not otherwise be readily included in the investment portfolio of an individual participating trust. Every dollar that an employee-benefit trust invests through the medium of a commingled fund is, in effect, "spread" among all the investments of that fund.

The participating trusts, therefore, no matter of what size, obtain all the investment advantages inherent in a very large fund.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Deferred Tax Savings

(*Continued from page* 208)

considerably from year to year, can be expected to gradually increase over a period of years. Therefore, it would be unrealistic not to consider the possible cumulative effect of the continuous use of accelerated depreciation under the Code.

"If we assume, as we did . . . above, a constant income tax rate with no changes in the Code, there is evidence to indicate the aggregate amount of the higher depreciation allowances during the initial period under accelerated depreciation will not be offset by correspondingly lower aggregate depreciation allowances of subsequent periods so long as there is a continuing plant replacement or a growth. To the extent that such allowances are not fully offset, proportionate amounts of the income tax reductions resulting therefrom may for practical purposes be considered as 'permanent savings.' Thus, if applicant should continue to expand in the future as it has during the past, we recognize the continued availability of accelerated depreciation could provide a source of some permanent interest-free funds."

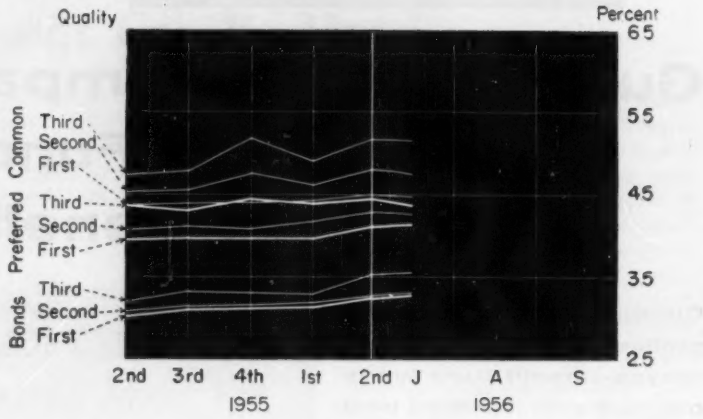
Income Tax Variations Cited

As an offset to the foregoing contentions that accelerated depreciation produces a seemingly permanent reduction in taxes, the commission was eminently fair in pointing out that "although (the foregoing) findings . . . are predicated upon assumptions which are relevant and worthy of consideration herein, it is recognized that there may be substantial variations in income tax rates from time to time, the provisions of the Code may be altered or repealed, and there is the possibility that for good reason applicant may not always elect to take accelerated depreciation. Any one or more of such possibilities could appreciably alter such findings or render them null. Hence, it becomes imperative for applicant to maintain records which will correctly reflect the current and cumulative effect of having taken accelerated depreciation."

As to the accounting treatment, the company proposed that the tax deferral be normalized under sub-account 507—Taxes and a corresponding credit be made to a special tax reserve under sub-account of 258.2—Miscellaneous Reserves. In the years that the depreciation deductions become less under the accelerated methods than under the straight-line methods, the accounting will be reversed with the special reserve being charged with the difference between the two methods and sub-account 507 being credited with this difference.

The commission, in accepting the applicant's proposals as outlined above, said, with considerable wisdom and fairness, that "the proposed procedures for accounting for accelerated depreciation are not contrary to the public interest nor to the Kansas consumers. Indeed, with proper accounting and the maintenance of data relative to Kansas operations . . . there is a strong possibility that the Kansas consumers will be able to share, at least indirectly, some of the benefits which applicant will derive from accelerated depreciation. There will result at least temporary percentage reductions in applicant's overall cost of capital due to the interest free funds which, under circumstances discussed . . . above, have permanent possibilities. The treatment to be accorded the benefits derived from the use of accelerated depreciation is not a matter for determination herein, but if the directives provided in this order are followed, appropriate data will be available for consideration in any future rate review by the commission," the order stated.

Today's Utility Yields (%)

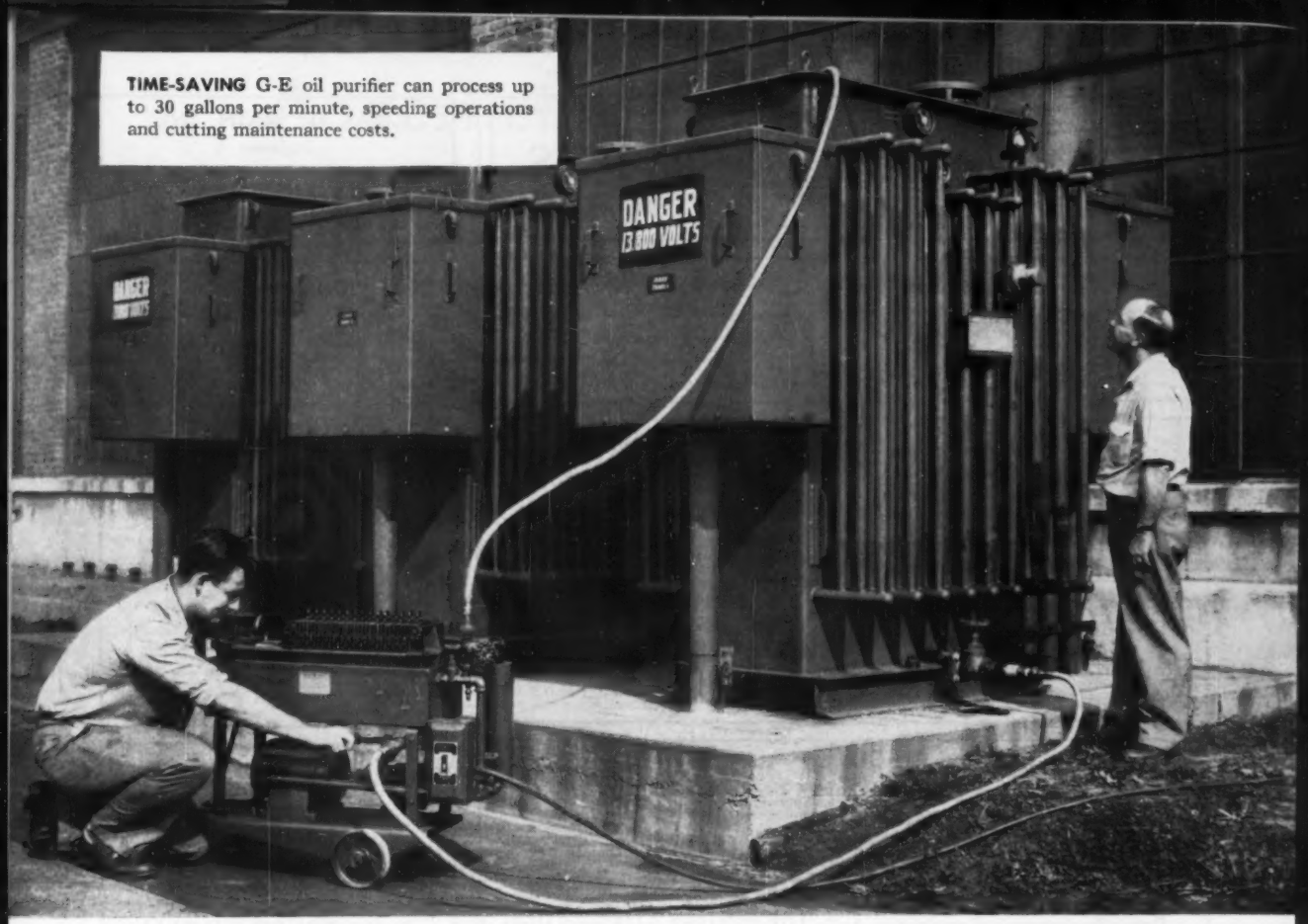


	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY.....	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
July 12.....	3.28	3.29	3.56	4.13	4.24	4.48	4.38	4.74	5.14
July 5.....	3.27	3.28	3.55	4.12	4.27	4.49	4.41	4.79	5.17

Utility Earnings

COMPANY	PERIOD MONTHS	ENDED	NET INCOME 1956	NET INCOME 1955	EARNINGS PER COMMON SHARE 1956	EARNINGS PER COMMON SHARE 1955
Arizona Public Service.....	12	May	$5,723,000	$5,185,000	$1.43(a)	$1.52(a)
Baltimore Gas & Electric.....	5	May	8,349,000	6,456,000	1.23(a)	1.03(a)
Consumers Power.....	12	May	30,956,668	27,486,069	3.33(a)	3.07(a)
El Paso Electric.....	12	May	2,262,484	2,141,357	2.37(b)	2.39(b)
Middle South Utilities, consolidated.....	12	May	15,059,303	14,908,070	1.98	1.96
Montana Power and subsidiaries.	12	May	8,834,983	7,974,615	3.07	2.72
Pennsylvania Power & Light.....	12	May	23,328,785	21,927,020	3.30	3.07
South Carolina Electric & Gas...	12	May	5,321,345	4,955,117	1.40(a)	1.29(a)
Texas Utilities, consolidated	12	May	25,292,465	23,643,668	2.07(c)	2.00(c)
West Penn Electric, consolidated.	12	May	17,828,276	16,463,900	2.11	1.94

Notes—(a) Based on average shares outstanding; (b) Based on 896,412 shares in 1956 and 840,387 shares in 1955; (c) Based on 12,210,000 shares in 1956 and 11,810,000 shares in 1955.



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Easy to Use—Simplicity of operation saves time in training maintenance crews. Unskilled workmen can easily set up and operate G-E purifiers. The single-phase pump motors operate on 115/230 volts, and the filter-paper drying ovens used in conjunction with the equipment are rated for either 115/230 volts or 230/460 volts. Purifiers and ovens can be quickly connected either to single-phase lighting circuits or to one phase of a three-phase circuit.

For More Details—For complete information on low-cost G-E purifiers for oil and Pyranol, drying ovens, and filter paper, contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEA-1333, Section 431-45, General Electric Company, Schenectady, New York.

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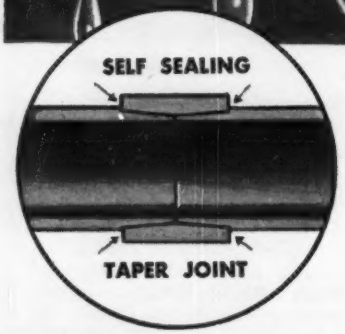

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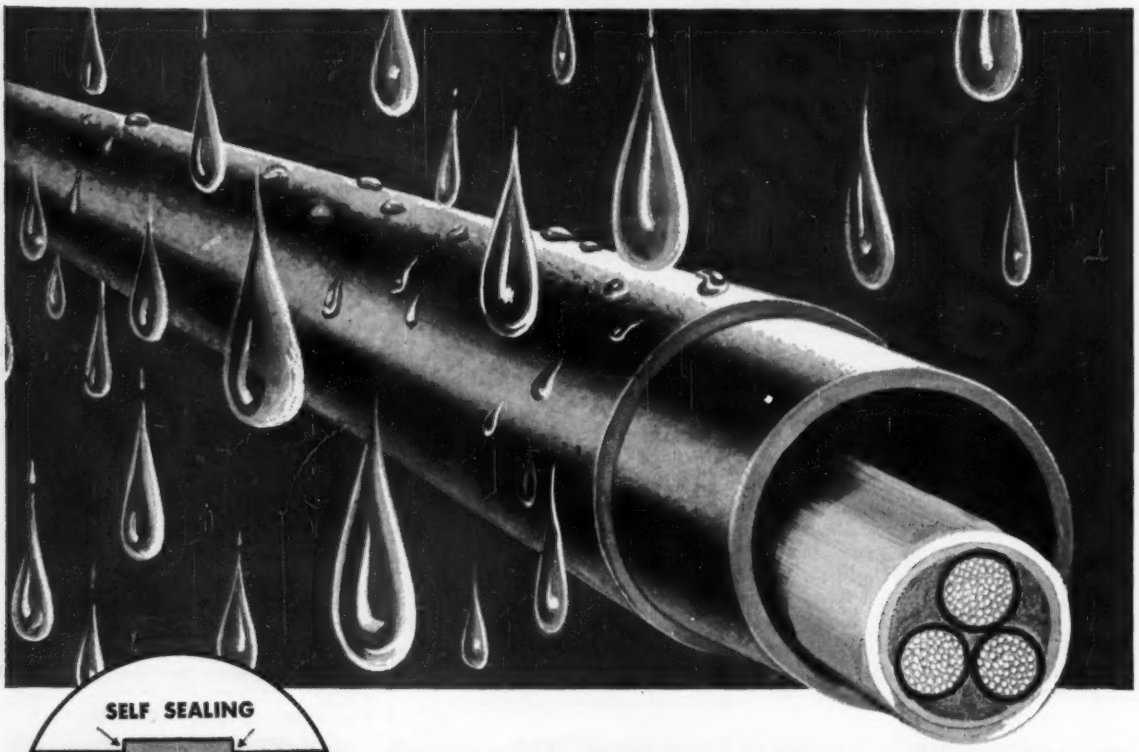

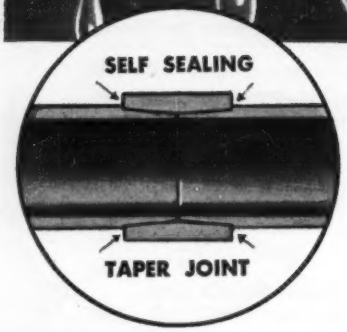

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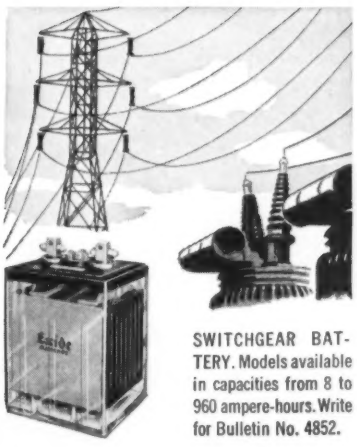

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